THIRD SERIES VOL 56 NUMBER 11 SEPTEMBER 1949

THE JOURNAL OF THE ROYAL INSTITUTE OF BRITISH ARCHITECTS

66 PORTLAND PLACE LONDON W1 · TWO SHILLINGS AND SIXPENCE

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Santa Maria dei Miracoli, Venice. From the drawing by W. Curtis Green, R.A. in 'The Drawings of W. Curtis Green', reviewed in this Journal

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THIRD SERIES VOL 56 NUMBER 11 : SEPTEMBER 1949 : 66 PORTLAND PLACE LONDON W1 : TWO SHILLINGS & SIXPENCE

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The 1949-50 Sessional Programme

A card giving particulars of the Institute's programme for the forthcoming session will be found inserted in this JOURNAL. The session is to be opened formally by the President on 1 November, when he will deliver his Inaugural Address. The second meeting is to be concerned with the important topic of town and country planning, its effect on architecture and on the profession. On 15 November the Hon. Lionel Brett, M.A. [*A*], will speak his *Second Thoughts on Planning*, and we understand that he will deliver an objective criticism of the Act and its workings.

At the first general meeting in the New Year, Mr. Hope Bagenal, D.C.M. [*F*], will speak on *Concert Halls*. Mr. Bagenal always attracts a large audience of architects, and his subject on this occasion is one in which he is acknowledged to be the leading expert in the country. Considerable advances have been made by B.R.S. research in acoustics since the war, though there appears still to be some doubt whether acoustics is a science or an art; the views of Mr. Bagenal, as an architect who has a thorough grasp of the scientific aspects, should be of interest and value.

At the presentation of prizes and studentships on 7 February the President will deliver his Address to Students and the criticism of the designs submitted in the various competitions will be made by Mr. E. Maxwell Fry [*F*]. On 21 February *The Work of Lethaby, Webb and Morris* will be discussed by Mr. Noel Rooke, who succeeded Lethaby as head of the Central School of Arts and Crafts. Mr. Rooke's paper is perhaps a further excavation of the rich Victorian vein from which the overburden was removed in the last session by Mr. Goodhart-Rendel when he disclosed the 'rogue architects' of that era.

More 'in the news' will be Mr. Hugh Casson, M.A. [*A*], on *The* 1951 *Exhibition*. By 7 March many of the designs for the South Bank should have been published, and Mr. Casson's exposition of them should prove interesting. It is no secret that full advantage is being taken of the licence traditionally accorded to exhibition designers to stage experiments in design and construction.

The Architectural Science Board are keeping rigidly to their technical field in arranging lectures on steel economy, building technique, house heating, timber technique, light alloys and building in the tropics. At the first meeting on 11 October Mr. L. W. Elliott, A.M.I.C.E., A.M.Struct.E. [*A*] will speak on *Economy in the Use of Steel in Building*, and on 22 November Mr. R. Fitzmaurice [*Hon. A*] will lecture on *Changes in Building Technique*. Mr. Fitzmaurice has recently been appointed Director of Research (Building Development) at the Ministry of Works. The last A.S.B. lecture of this year will be by Mr. Richard Eve, B.Arch. [*A*], who will describe the second stage of the important B.R.S. house heating experiments at Abbots Langley and their possible effects on house design.

Examination of American Building Industry

The Team representing the British Building Industry which went recently to the United States to study the American Building Industry have issued a preliminary statement, on their return. The full statement is published on pages 485 and 486 of this Journal. Members will recollect that the Team consisted of architects, contractors, sub-contractors, quantity surveyors and operatives. The architect members, nominated by the R.I.B.A., were the President, Mr. Michael Waterhouse, M.C., and Mr. R. H. Matthew [*A*], Architect to the London County Council. A full report by the team is being prepared.

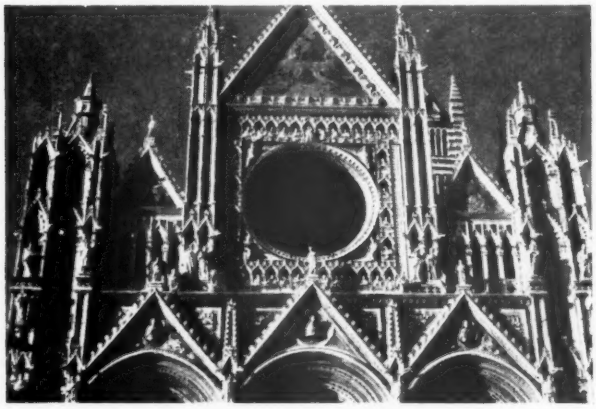
The Industrial Architecture Exhibition

The R.I.B.A. Industrial Architecture Exhibition had a very successful, though short, showing in the Birmingham Chamber of Commerce at the end of July. The opening ceremony was performed by Mr. Paul Cadbury and on the platform with him were the Lord Mayor (in the chair) and Mr. F. J. Osborne [*F*], President of the Birmingham and Five Counties Architectural Association. Approximately 80 industrialists and members were present. Mr. Cadbury said everyone knew how much the prosperity of the country depended on the efficiency of industry. The Midland industrial area was in a good position to take stock of the situation and the exhibition was a cogent summing up of possibilities. Mr. F. J. Osborne, thanking Mr. Cadbury, stressed the necessity for consulting the architect at a very early stage and of very full and detailed study of a problem before plans were accepted. Time then spent meant time saved later and certainly money as well.

Eminent Australian Architect visits Britain

Mr. Adrian Ashton, F.R.A.I.A. [*A*], President of the New South Wales Chapter, is in Great Britain on a three months' visit to see housing developments, new schools, industrial buildings and town and country planning schemes. Mr. Ashton is to attend the next meeting of the Allied Societies Conference and will probably attend meetings of the R.I.B.A. Council as representative of the Royal Australian Institute. Mr. Ashton is visiting this country under the auspices of the British Council.

Two photographs from the Italian Architecture Exhibition to be held at the R.I.B.A. in October. Above: Portofino Harbour, Liguria. Below: West front of Siena Cathedral



Exhibition of Modern German Art

The Institute of Contemporary Arts is arranging to bring to this country the first representative exhibition of modern German art to be seen in England since the war. The exhibition will be shown under the auspices of the Arts Council at their St. James's Square gallery for one month in November, and will thereafter tour provincial centres.

The exhibition will consist of some 120 drawings, water-colours, lithographs, etchings and woodcuts by forty artists. Stylistically the exhibition ranges from Emil Nolde (the 'Father of German Expressionism' now in his 82nd year) to such young 'moderns' as Trökes, the Berlin surrealist, and the abstract artist, Ernst Wilhelm Nay.

Palladian Exhibition at Vicenza

An exhibition has recently been opened in Vicenza by the Italian Minister of Education in celebration of the four hundredth anniversary and restoration of the Basilica Palladiana, which was damaged during the war. Among the chief items displayed in the Museo Civico at the Palazzo Chiericati are seventeen albums of drawings by Palladio from the Duke of Devonshire's collection, which are normally preserved at the R.I.B.A.

The A.B.S. Annual Report

The Architects' Benevolent Society's Annual Report (familiarly known as 'the A.B.S. Red Book'), 1948-49, has now been published. The Balance of Income Account up to July of this year is £3,113, Capital Account £262, and balance of Memorial Fund £363.

Exhibition of Italian Architecture

On 6 October Lord Rennell is to open an exhibition of photographs of historic buildings in Italy taken by Mr. Ralph Deakin, Foreign Correspondent of *The Times*. The committee arranging the exhibition has made a selection of some 500 enlargements, all of which are of an exceptionally high standard: many of the viewpoints chosen for the photographs are quite original, and the exhibition will also contain photographs of little known 'gems' of Italian architecture.

The exhibition will be one of the most interesting collections of photographs shown at the Institute since the photographs taken by Mr. Upham Pope of Persian architecture were shown in 1936. The present exhibition must of necessity be far from complete in view of the inexhaustible wealth of architectural subjects that Italy has to offer; but it is hoped that the pictures chosen will be found not lacking in inspiration for architects and artists and will at the same time please a wider general public.

The prints embrace Ancient Rome and Renaissance Rome; the Greek temples of the South; and those centres like Venice and Palermo, which have exerted a powerful influence, in Italy and elsewhere, on subsequent epochs. Feudal cities like Siena, San Gimignano and Perugia are included in the survey, and the course of civic and ecclesiastical experiment is illustrated in such places as Pisa, Lucca, Florence, Bologna, Assisi and several other famous centres of art.

The photographs are not the work of a professional photographer but of a traveller who has spent much time studying historical buildings. The committee has been to some pains to arrange them in attractive form, and feels sure that an hour spent among these striking structures of the South will be an agreeable change from the utilitarian forms which a harsh decade has forced upon our attention in this country. The Institute hopes especially that the exhibition will be visited by educational groups.

The exhibition will be open to the public on 7 October, and will remain on view until Saturday 29 October. (Weekdays 10-7, Saturdays 10-5.)

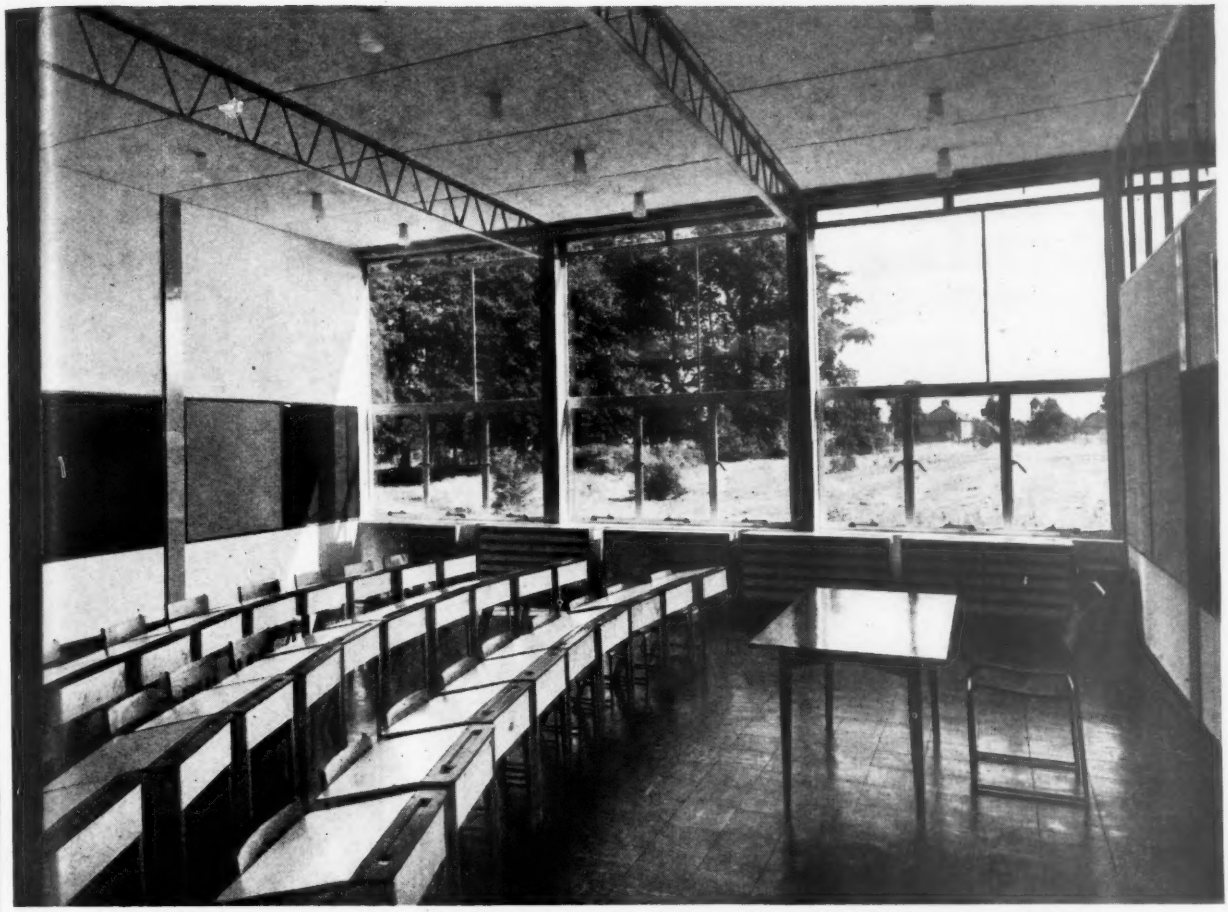
Conference on 'Scottish Needs in Building Research'

The Building Research Station's Scottish Laboratory at Thorntonhall is now partly completed, and a nucleus of staff have begun work there. In connection with this, a one-day conference on 'Scottish Needs in Building Research' is to be held in Glasgow on Thursday 6 October in the Rankine Hall of the Institution of Engineers and Shipbuilders in Scotland, 39 Elmbank Crescent, Glasgow. Apart from introducing the new laboratory, the purpose of the Conference is to provide a forum from which Scottish members of the building industry may express their views on Scottish building problems which need research.

The President of the Conference will be The Right Hon. Lord Morrison, Parliamentary Secretary, M.O.W., and the chair at the afternoon session (2.30 p.m.–5 p.m.) will be taken by Mr. W. K. Wallace, C.B.E., M.I.C.E., Chairman of the Building Research Board of the D.S.I.R.

The principal paper in the morning session (10.30 a.m.–12.30 p.m.) will be given by Mr. L. W. Hutson, O.B.E. [*F*], President of the Royal Incorporation of Architects in Scotland, on *The Scottish Tradition in Architecture and Building Construction*, preceded by an opening speech by Dr. F. M. Lea, O.B.E., Director of Building Research on *The Building Research Station and its Scottish Laboratory*. The feature of the afternoon session will be a discussion on *Special Problems of Building in Scotland* in which a number of speakers representing the various sides of the industry are to be invited to give a short statement of their views.

Admission to the Conference will be by ticket, and invitations will be issued on as wide a basis as accommodation will permit. Requests for tickets should be made to the Director, Building Research Station, Garston, Watford, Herts.



A typical classroom showing the standardized equipment. The classroom is in Croxley Green Little Green Lanes Junior School

The Post-War Schools of the Hertfordshire County Council

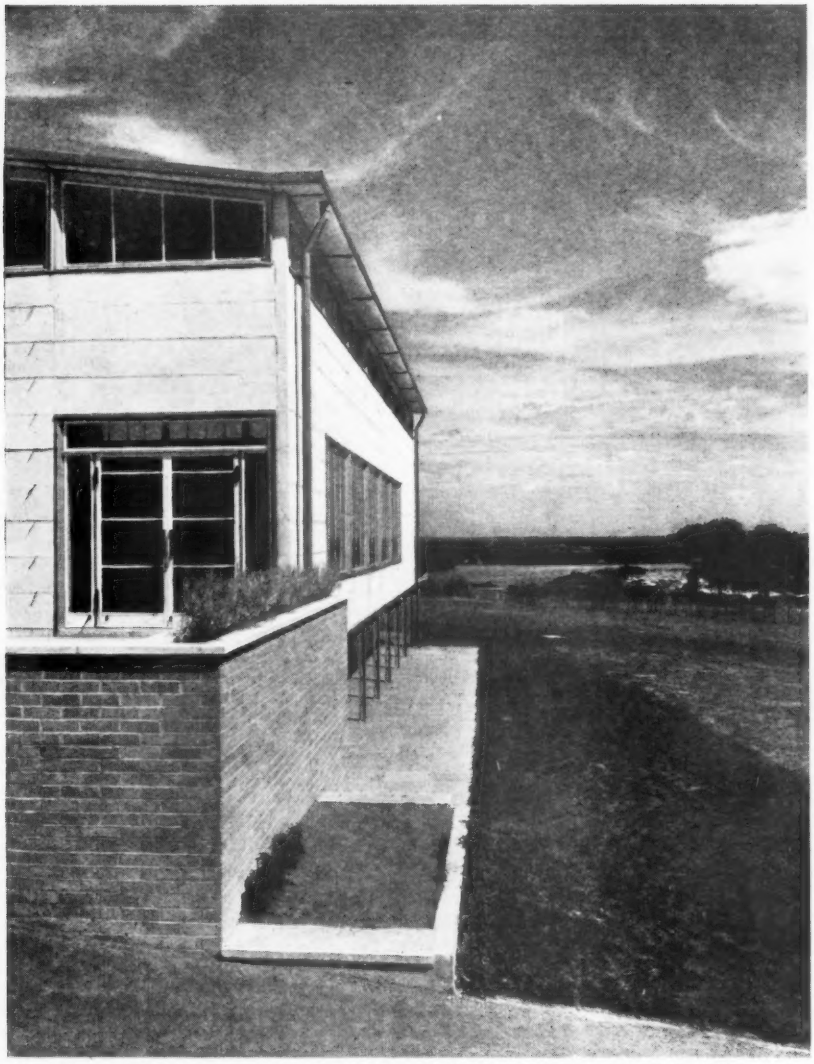
County Architect: C. H. Aslin [*F*]

THE MINISTER OF EDUCATION said recently in a public speech that the average cost of schools now being provided by the Hertfordshire County Council was £150 a place, whereas the average for the remainder of the country was £200 a place. It is obvious that the Ministry is unlikely to sanction any school building with a construction or standard of accommodation which does not conform fully with the regulations, and it therefore appears likely that architects concerned with school design will be interested to know how the Hertfordshire County Council is obtaining this remarkable result. We accordingly asked the County Architect, Mr. C. H. Aslin, if we could publish a report on the methods adopted, and he has afforded the necessary facilities.

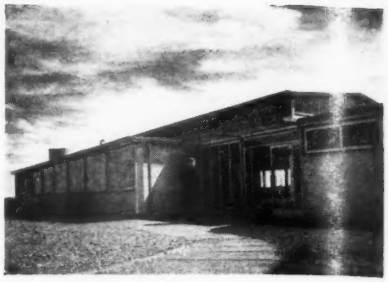
The programme of prefabricated school building in Hertfordshire, now in full operation, may be said to have begun with a realization of the fact that the intentions of the 1944 Education Act could not be implemented in the county within a reasonable number of years unless new schools were provided at the rate of at least 20 a year for several years to come. The next step was to study the factors which today make for high cost and for slow production of finished buildings. The three principal ones were found to be:

1. Delays in delivery of material.
2. The slowness of the machinery for getting an individual school building project sanctioned and started.
3. The relatively small capacity of the county for providing school buildings by normal methods.

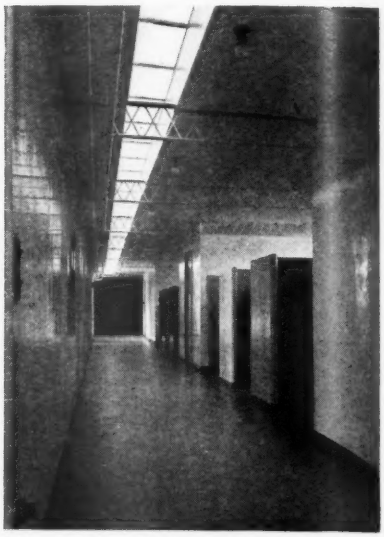
The post-war difficulties in obtaining delivery of materials are known by all architects to be a principal cause of high costs and slow building. Normally, it is not until a contract is let that the contractor is able to place the orders for his materials, so that distant dates of delivery of those materials which are in short supply (plus the fact that delivery dates are not always adhered to)



The sloping site has been used to create a covered play space beneath part of the hall



The main entrance



The corridor with classrooms on left and cloaks on right

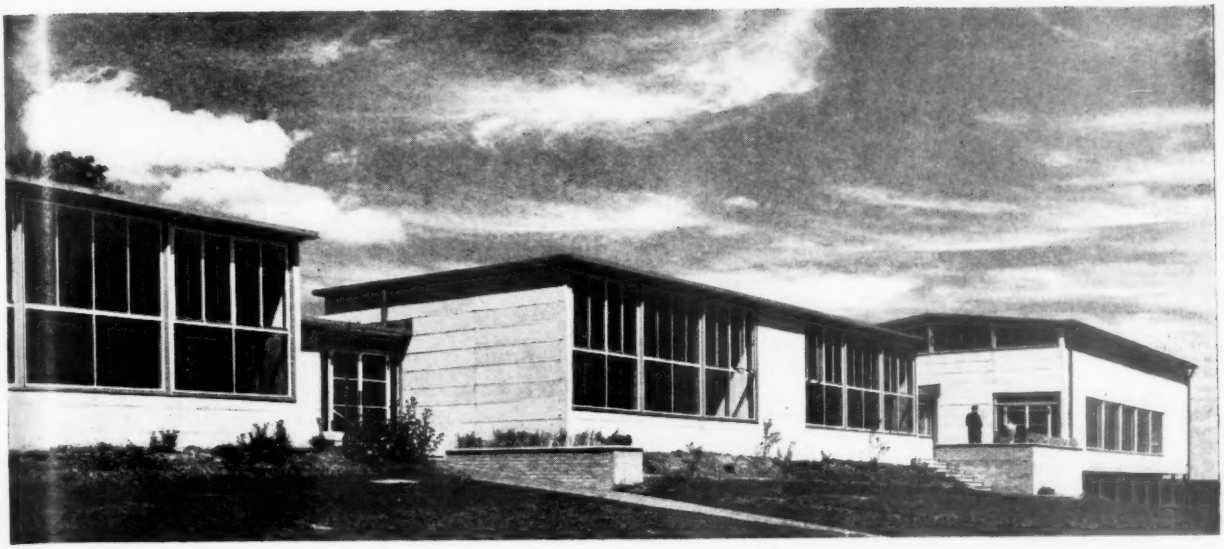
The Junior Mixed and Infants' School at Essendon (120 places) is illustrated on these two pages. One of the earlier schools, it has features which have now been amended: notably, the horizontal slab cladding is now superseded by vertical and the eaves detail has been revised

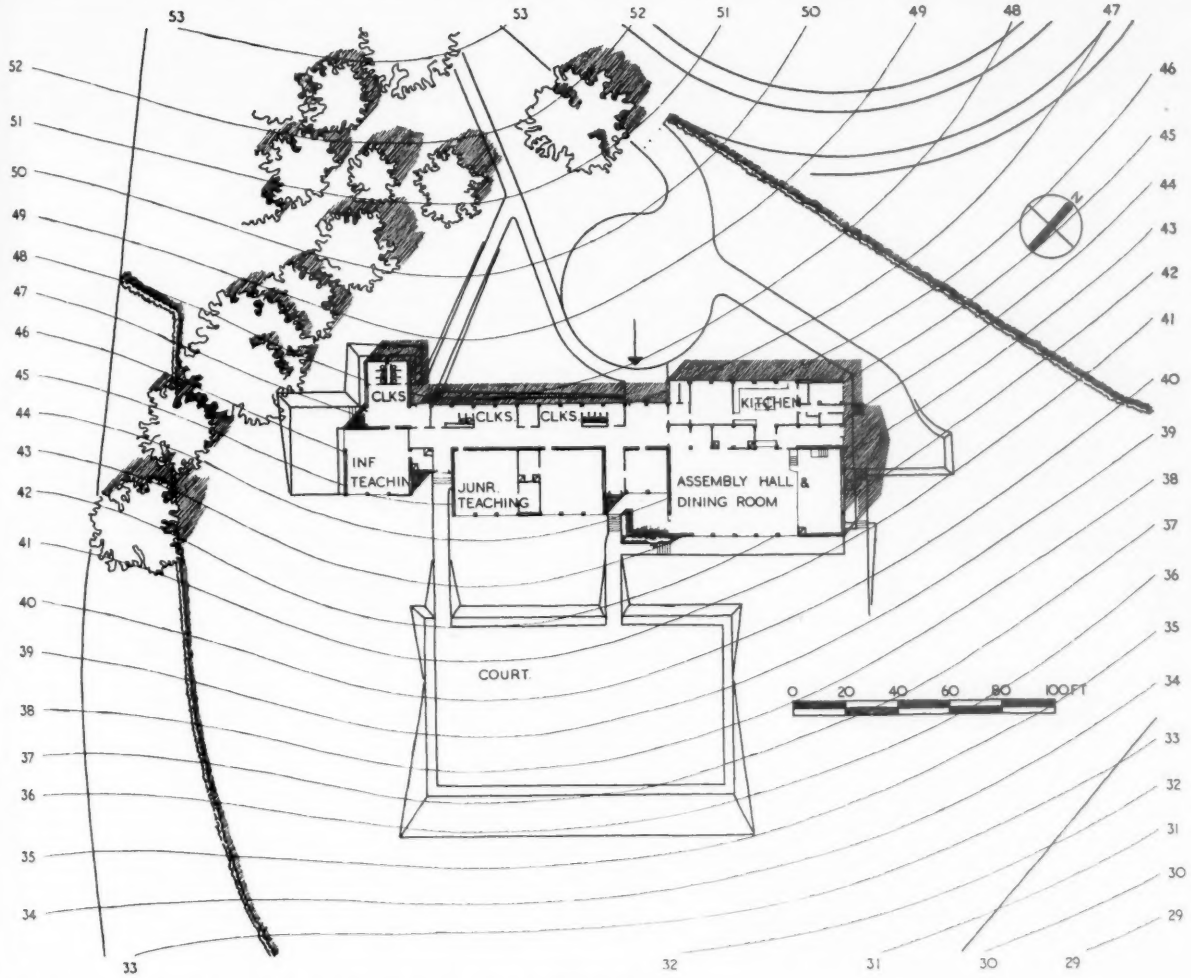
cause slow building, dislocate the job organization and may even bring about stoppages; the contractor has to cover himself in tendering against these risks.

To meet this problem of inter-related slow building and high costs the County Council, on the advice of the County Architect, sanctioned a system for pre-ordering building materials. The amounts of these are assessed for a year or two ahead up to about 90 per cent; they are ordered at negotiated prices by the Council, the stock being kept at the manufacturers. Thus when a contract is let, the contractor is assured that he can obtain delivery of all materials as he wants them. He does so at prices which are quoted in the bill of quantities. He is thus able to obtain his material without question of delay and to know precisely beforehand what it will cost him—a state of affairs which has hardly existed in general contracting since before the war. Incidentally the standard builder's profit is not chargeable by him because much of the work which the term 'builder's profit' usually covers has already been done by the Council. The materials selected are mostly readily available; advance ordering of them has enabled manufacturers to spread the load of production which, in turn, has helped to ensure that materials are available when they are wanted by contractors.

As regards the machinery for approval of school building, hitherto it has been a common experience for the preliminary work, from a council's decision to build a school up to actually starting work, to take as long as 12 months. Sketch plans had to be prepared, approved by the education committee of a council and forwarded to the Ministry for their approval. On this being received, the working drawings, specification and quantities had to be prepared and tenders obtained. These were then submitted to the Ministry for final approval. Only when this was received could work start.

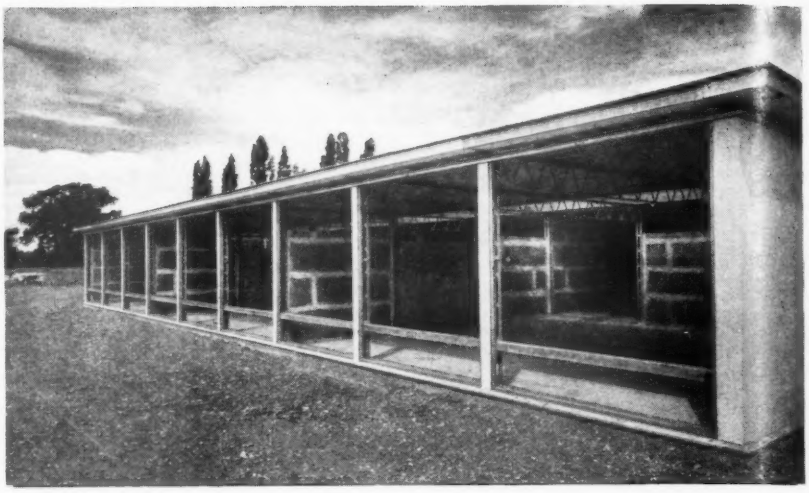
The Ministry decided, at the suggestion of the Hertfordshire County Council, that they would approve projects in sketch plan form, after which work could go ahead, the contract figure being reported to the Ministry subsequently. Full advantage of this administrative arrangement has been taken by the Hertfordshire County Architect. It has been greatly facilitated by the fact that the prefabricated construction is already well known to the Ministry and has already been approved by them, so that in approving a sketch plan, the Ministry have only to give approval on questions of size, siting, layout and accommodation. The County Architect asked us to say that the Ministry have been very co-operative and helpful in this arrangement. The important





The Junior Mixed and Infants' School at Essendon. Plan and south-east front

A block of classrooms under construction at a Junior Mixed and Infants' School in Hertford. This shows the new eaves detail used on all 1949 schools



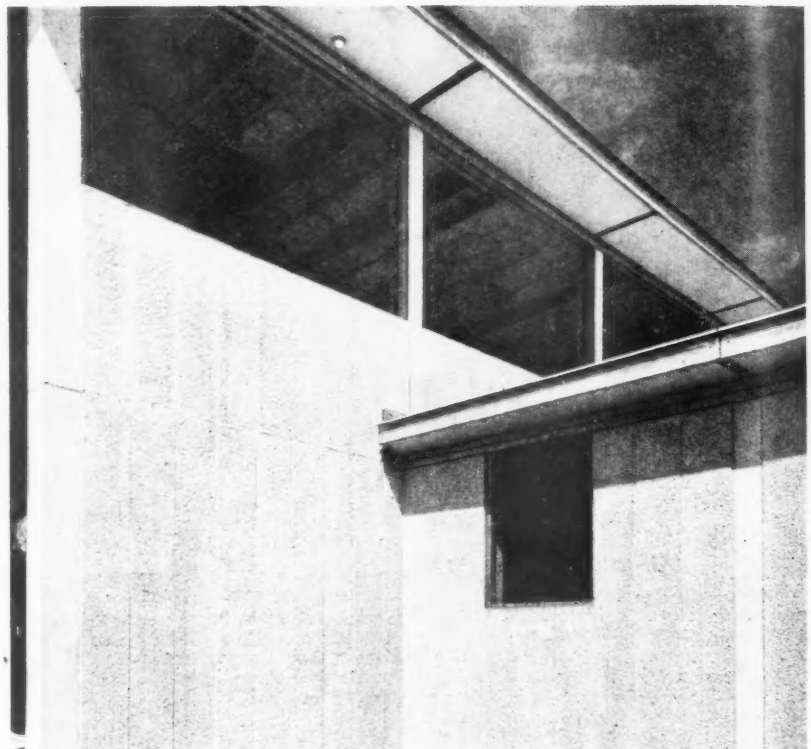
point is that preliminaries now take two months instead of twelve.

As regards the capacity of the county for building, it was realized that no contracting service was likely to be obtained from outside the county because all other counties were equally occupied. It was therefore desirable to make as much use as possible of the contracting service existing within the county and to employ both large and small contractors as much as possible. Nevertheless, the principal shortage was that of craftsmen, particularly of bricklayers. It was realized that, with the other demands on building in the county for which bricklayers were required, there would be no hope of fulfilling the school programme using normal brick building except over an enormous length of time

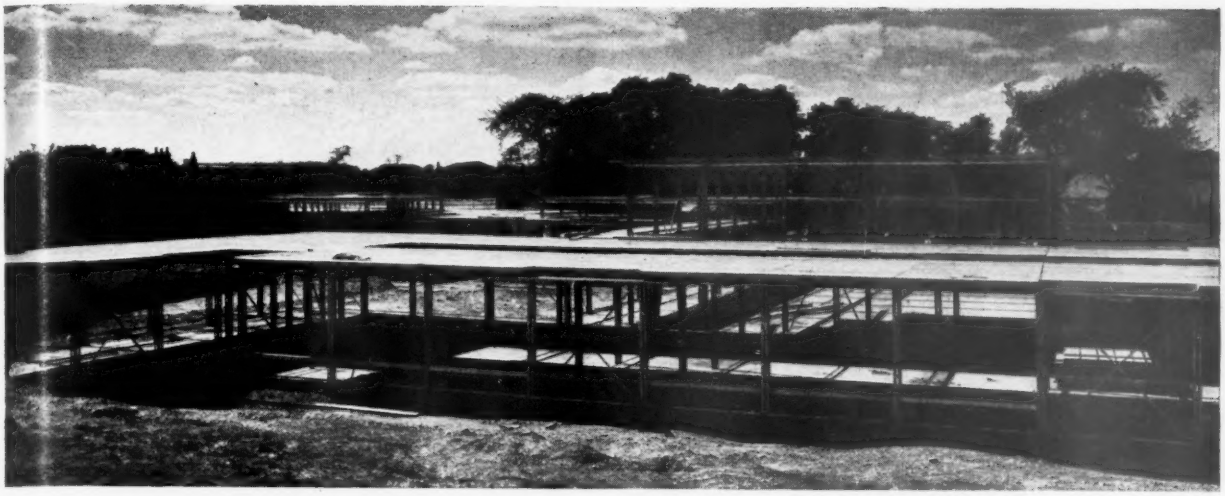
All these considerations led to the establishment of the system of prefabricated construction which almost entirely avoids the use of bricklayers, makes use of other forms of labour, both skilled and unskilled, and which can be erected by small contracting firms as well as the larger ones. The system was designed in the County Architect's department. It is one of small building units which can be used in several ways, for rooms of various spans and heights and which requires no elaborate machinery to assemble. It is in no sense prefabrication of whole buildings or sections of buildings—forms of prefabrication that are essentially inflexible and ones which not infrequently require expensive machinery for transport and hoisting. On the contrary, the system designed by the County Architect's Department has units which can be almost entirely manhandled for fixing and are transported in ordinary lorries. Further, it gives great flexibility in planning, so that any problem of site or aspect can be easily met. There is nothing like a standardized general plan and, indeed, no two schools are identical.

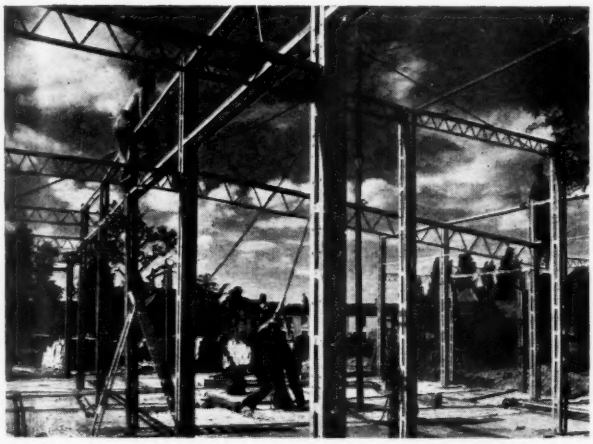
Briefly, the construction consists of a galvanized steel frame of cold formed units, bolted together, to which are attached precast vibrated concrete units for walls and roof. No ducts are provided for services, most of which are now prefabricated. This means that the majority of the heating pipes and plumbing can be seen, and particular care has been taken that these shall not be unsightly, and are yet expressive of their true purpose.

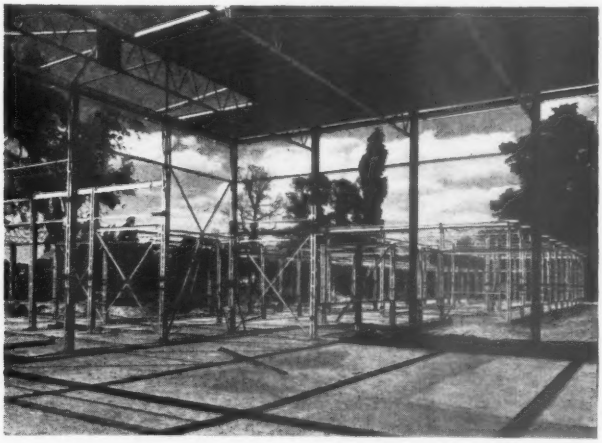
For experimental purposes, half of the steel frame of a 2,000 sq. yd. school was put up in one day. A considerable labour force was employed, and yet no undue overcrowding was experienced. This was done for two schools, but, of course, was something of a 'stunt' and was not an



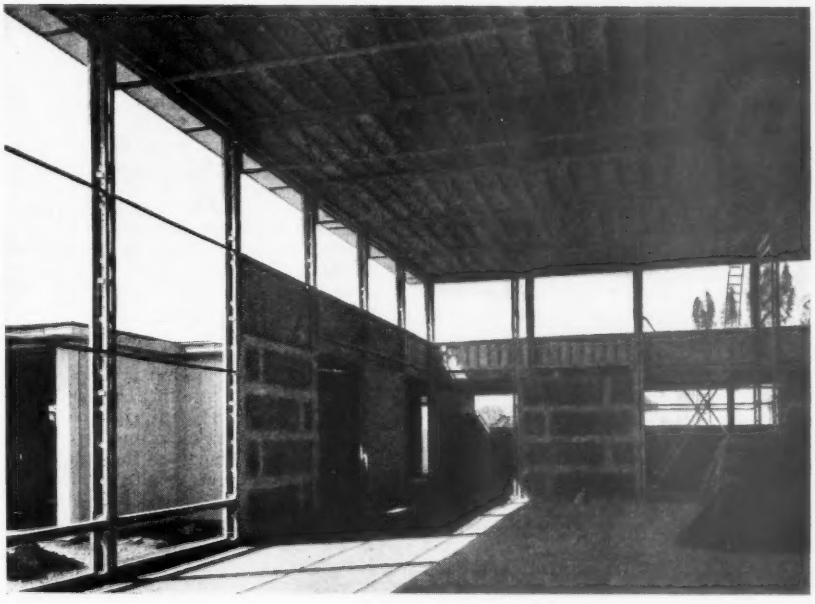
View showing various typical constructional details at the Hertford Junior Mixed and Infants' School, including frame members, precast concrete roof and wall cladding units and eaves details





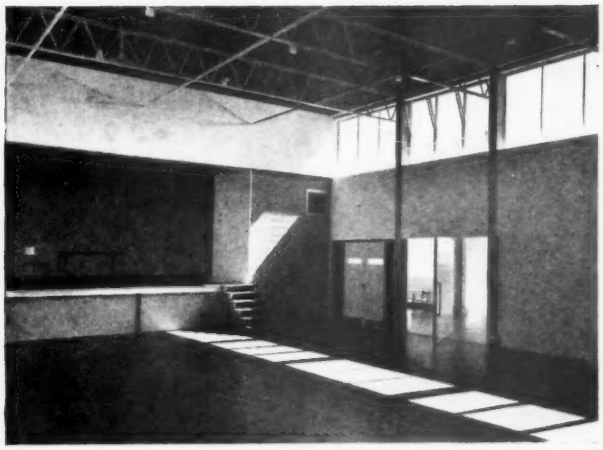


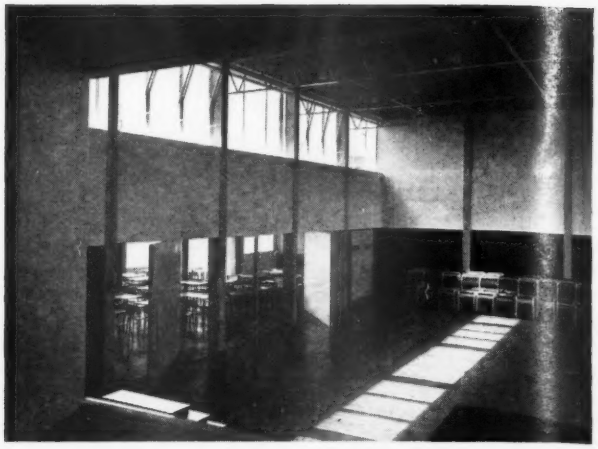
Various views of schools under construction. Top: the frame and roofs of Kingsway Junior School, Watford (360 places). Middle left: hoisting (by two men and a simple pulley) a lattice beam at the Watford school. Middle right: the hall framing of the Watford school partly roofed; a classroom range in the distance. Below: the hall at the Hertford school; the wall cladding is partly fixed; the internal panel filling is of wood wool slabs



economical proposition for the steel erector. The steel frame of one of these schools was then roofed and walled in with concrete slabs in 10 days. One bricklayer and one labourer can bolt up, grout in, and point up, approximately 212 sq. ft. of walling in one day. The internal wall linings and partitions were originally of fibrous plaster, but this was found to be too costly and slow, and *in situ* types are now being used with fibrous pilasters and cornices.

The establishment of this system of construction took a great deal of work. The first school to be built was expensive and occupied a very long time. This is, of course, inevitable in constructing a prototype for any system of what amounts to a form of mass production. Much was learnt





Four interior views at Belswains Junior Mixed and Infants' School at Hemel Hempstead (320 places). The plan and a view along the entrance pathway are on the opposite page. Above are two views of the hall showing the centre-pivoted screens which open the hall to the dining-room. Below, left: the entrance hall. Below, right: the dining-room. Skilful use of soft, clear colours is an outstanding feature of these schools to which the photographs can do no justice; it gives an effect of gaiety to the interiors and emphasizes the simple modelling of the structural and enclosing forms

from early mistakes, and a great deal of time was occupied by the County Architect's staff in consultations with the suppliers of the units. The time taken by these consultations was well spent. For instance, the original number of steel stanchion units was reduced eventually from 26 to 6, while the plumbing was so studied that 80 per cent of the work on it is now done in the workshop. It was found necessary to design to tolerances which are far closer than is customary in traditional building. It took time to get all the suppliers to supply their units within these tolerances, but all these preliminary troubles have now been overcome and the system is working smoothly, though there is a Development Section in the County Architect's office which is continually studying improvements.

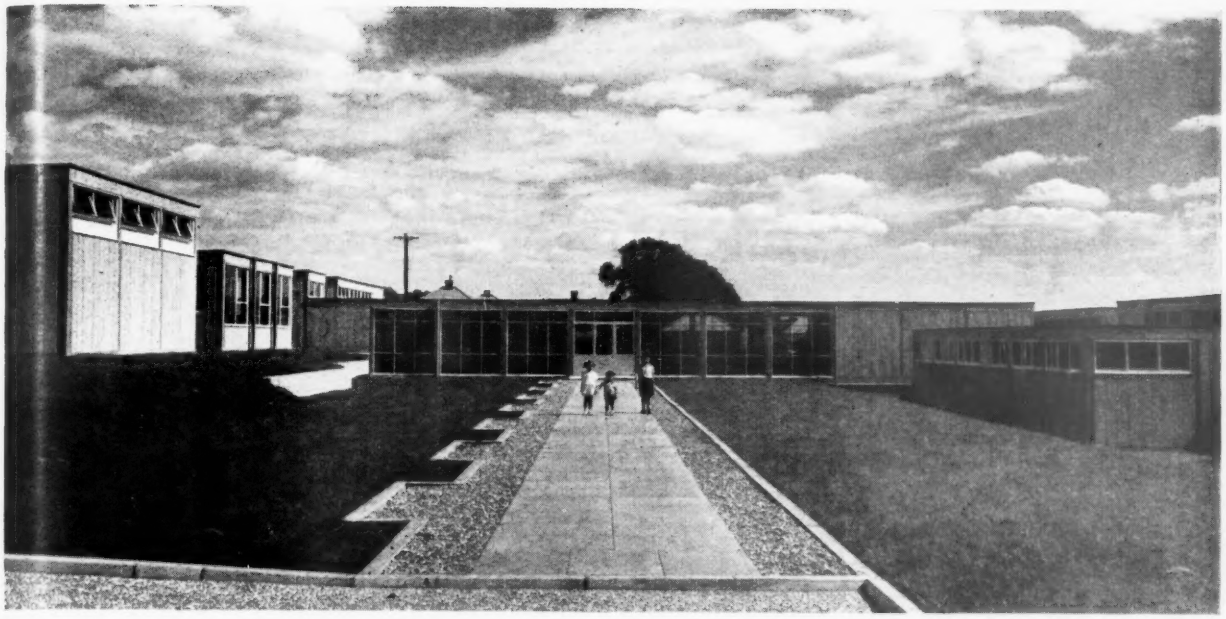
The system is advantageous to all concerned. There is a great saving in office overheads in the County Architect's department, the amount of assistants' time that has to be spent on a single job being very much less than normal; the contractor is assured of quick delivery of accurately made components which have been already inspected and approved in the works of the suppliers before they reach him; the supplier has assured orders at agreed prices so that he can lay out his production for months, or even years, ahead. An overall result is a tendency for the cost of the units to fall, while delays in delivery are few and trivial.

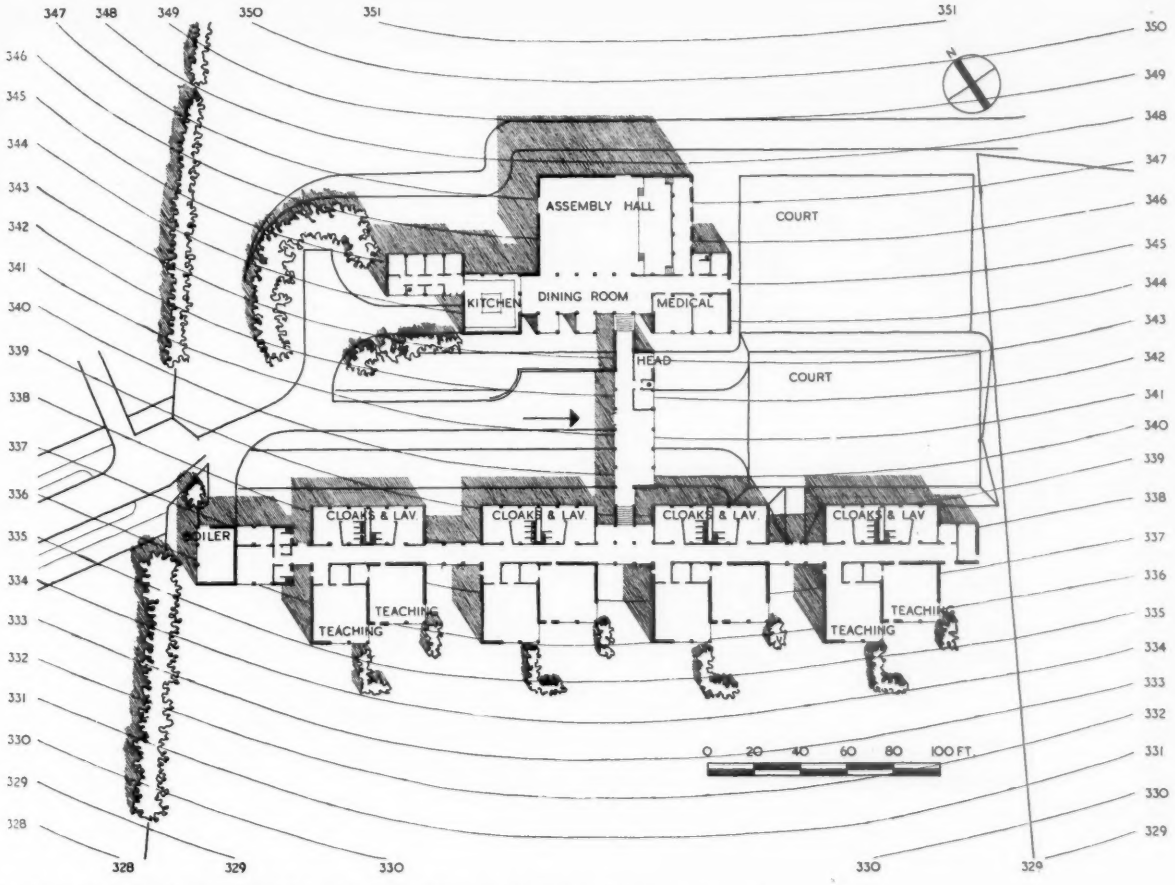
A not unimportant feature of the general scheme is that in several instances the suppliers fix their own products; for example, the steelwork supplier erects the framework. This results in the suppliers themselves taking great care that their units are accurately made and delivered quickly; it also widens the field of labour beyond the county, because much of the total man hours expended on a school is of labour in other parts of the country; it also avoids argument between the general contractor and the suppliers.

It might be thought that the general contractor has not a great deal to do and that most contractors would not be interested in undertaking work of this nature. Neither has been found to be the case. The method is one which has been considerably used by the Ministry of Works and contractors generally like it because it gives an easily worked job. The contractor receives site plans, setting out plans and the standard drawings for assembly which are used on every job. He prepares the site and the foundations on which the frame is assembled and he fixes the concrete cladding, the insulation and linings, lays the drains and paths, etc., and he also does the normal finishings such as painting. Supervision is by a clerk of works who is responsible for two or three jobs according to location.

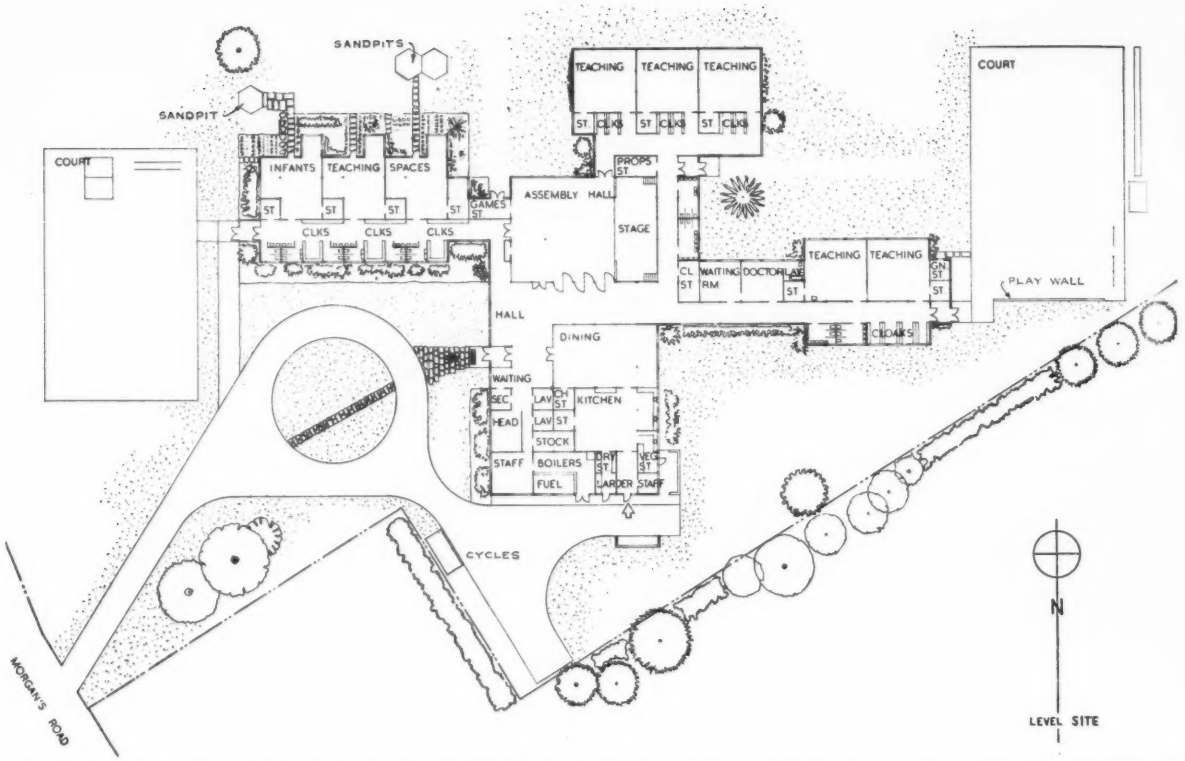
The system takes the fullest advantage of prefabrication in reducing the amount of work done on the site, and therefore in reducing delays from inclement weather. The construction is also very largely a dry one, so delays for allowing walls to dry out before they can be decorated are very much reduced. As the local contractors become accustomed to the system, so is the erection becoming more rapid and costs tending to fall.

The programme for 1949 allows for the starting of 21 primary schools, that is to say about two a month. They are organized





Belswains Junior Mixed and Infants' School at Hemel Hempstead. Plan and entrance approach



Plan of the Junior Mixed and Infants' School at Hertford now under construction as shown in the photographs on page 474 and page 475 (bottom). The school has 240 places

in the County Architect's office in batches of six. A complete bill of quantities is provided for one school and schedules of variations for the others according to size and differences in site works. In theory a single contractor could obtain the contract for all six, but in practice this never happens. It has been found that the location of each school in relation to the headquarters of the contractor, or whether he has any job in the neighbourhood which he can organize at the same time as the school, gives one contractor a slight advantage over another in regard to a particular school. It is also noteworthy that tendering is keenly competitive and that the contracts are by no means restricted to a small group of firms.

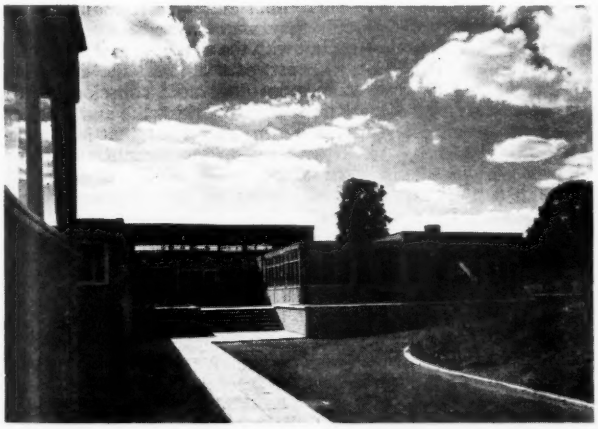
The organization of the architectural service also requires some description. The first schools were designed and supervised entirely by the County Architect's department, and most of them still are, but private architects are used for a certain number of schools. A new man entering the Architect's Department takes his place in a group producing working drawings for a number of schools. As he masters the technique of the system of construction he is given a school to design upon which he, in turn, receives working drawing assistance from other members of the group. Similarly the method with a private architect is to invite him first to carry out working drawings on a sketch plan already produced by the department. This familiarizes him with the system and he is afterwards invited to carry out a similar job from the beginning.

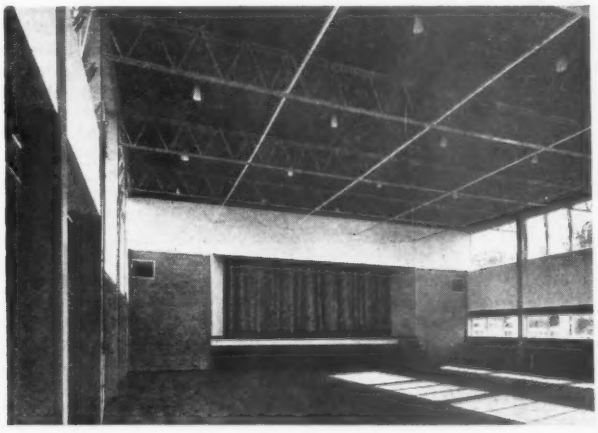
A special point is made of consultation with 'the client', that is to say, with the County Education Officer, his staff, specialists, teachers, etc. These form a first-rate client, because the programme is formulated in the clearest and broadest terms from the inception. Further, after a building is occupied and its staff appointed, meetings are held with the teachers to discover any improvements which may be made or defects avoided in future projects. This works very happily, and several suggestions made by teachers have been adopted.

Perhaps the point of most importance which emerges from this Hertfordshire method of school building is that the organization of prefabricated building requires an approach that is radically different from that to traditional building. It is not a question of producing a number of isolated buildings so much as one of *organizing an operation* for providing new schools throughout the county. Such an operation has to start right back in the design offices of the suppliers of materials, the architectural and contracting services have to be varied from what is customary in traditional building and the whole programme has to be kept in view and planned a long time ahead; the completion of each school is no more than an incident in the whole operation.

Failure to realize the nature of the *organizational* problem inherent in prefabricated building is probably behind the failure of so many attempts at prefabricated building to cost less than traditional building. The saving of a shilling or two on the cost of a unit—unimportant when a single building is in question—becomes of first importance when thousands of units are to be made; hence the necessity for the architect working in prefabrication to discuss with the maker such apparently trivial matters as the drilling of an extra hole in a unit. Questions of handling—whether a unit can be lifted by one man or two or whether a hoist is needed—the proportion of probable breakages in handling, whether assembly can be done without frequent stoppage for consultation of complex drawings, these are but examples of the way in which the architect must study apparently quite trivial matters if prefabrication is to pay. The aphorism 'time is money' is literally true in prefabricated building. It is in this kind of detailed study that the cost saving of the Hertfordshire system of prefabrication has been achieved. It is not achieved by substituting shoddy materials or methods for 'good building'; rather is it true that prefabrication requires the best materials of their kinds that are obtainable, because by their use failures, breakages and, in the long run, maintenance costs are reduced to minima. Nevertheless, even this detailed study will not be

Little Green Lanes Junior School at Croxley Green. Above: a general view. Below, left: the main entrance. Below, right: the interior of the hall. The playing field in the foreground has not yet been levelled and laid out. The school has 360 places





fully effective if the problem of providing a given number of prefabricated buildings is not regarded as a single operation in which all the factors—design, manufacture, transport, assembly, finishing, overheads—are considered together and separately as contributory items of cost.

The cost per place of an individual school is no reliable guide to overall cost. Some schools, by reason of their size, site location and possibly difficult site work cost more than the average. Others may cost less. What matters in the long run is the average cost per place of all the new schools in the county and, perhaps more important, the speed at which the schools are at present being provided for a growing population which is very badly short of school space. As the R.I.B.A. said in its post-war report on school buildings, there is a danger that a whole generation may grow up in sub-standard school buildings. This evil the Hertfordshire scheme is clearly doing much to avoid.

The question of the architectural appearance of the schools is outside the scope of this article. It can be said, however, that the people whose children use them have shown marked appreciation of their qualities, amounting at times to enthusiasm. It is true that a satisfied client does not necessarily connote good architecture, though such satisfaction must be a chief aim in all public authority building.

The illustrations give a fair idea of form and massing, though they can give no clue to the skilful use of colour which is an important feature of the designs, specially of the interiors.

Finally, it should be emphasized that these buildings are not temporary in any sense of the word. They are permanent structures which will certainly outlast their loan period, and will require no more than normal maintenance. This point has been specially taken care of by thorough consultation with the Building Research Station, not only when the prototype was designed and constructed but continuously since, as school after school comes to be finished.

ERIC L. BIRD

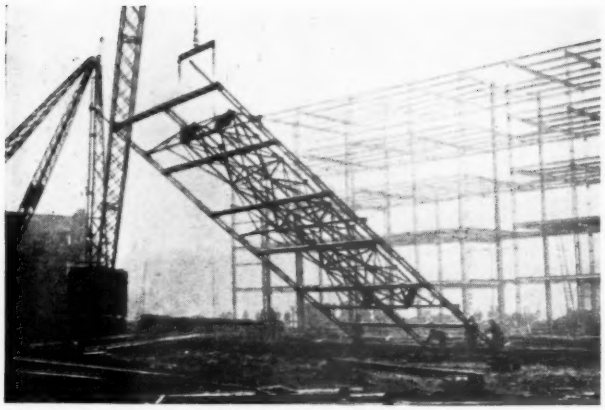


Fig. 1: Steel framework, Quarry Hill Flats, Leeds

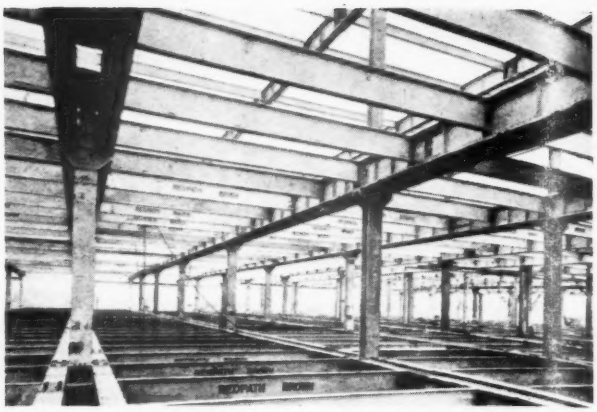


Fig. 2: Steel framework, British Nylon Spinners Factory, Pontypool

Structural Techniques

By W. S. Atkins, B.Sc., A.M.Inst.C.E.

A paper read at the R.I.B.A. Conference on Industrial Architecture, March 1949

I SHOULD LIKE to offer a few of my personal opinions on the subject of this Conference —that is, the advent of the architect in the industrial sphere. Obviously persons of my type, with an engineering training, are inclined to view a subject of this kind logically and dispassionately, and will try to measure the value of anything in terms of monetary return, because that is the basis of industrial undertakings. The particular question of the use of the architect in industry to my mind falls into two parts: the economic aspect and the sociological aspect.

Dealing first with the economic aspect, let us consider broadly the position of industry today. We have, firstly taxation at a very high level, and we must consider that it will continue at a high level for quite a long time. Secondly, we have to give thought to the rapid technical development in industry and the technical advances which impose themselves on production, whether the industrialist likes it or not. Technical advancement and invention necessitate greater mechanization in industry to achieve cheaper or more perfect production, and this often means complete reconstruction. It even means among the bigger firms, who have a number of works scattered round the country, that it may become advisable to build one central mechanized outfit to replace several of those already existing. Where this reconstruction means a new plant with a complete new building or buildings, as it so often does, we are faced with the problem that the capital expenditure is not comparable with the additional return, in that the total additional earnings represent a very poor increment on the total additional capital outlay. It must be remembered that this additional income is also subject to taxation, and that technical advancement still proceeds, and the necessity for reserves in industry remains just as great as before, if not greater.

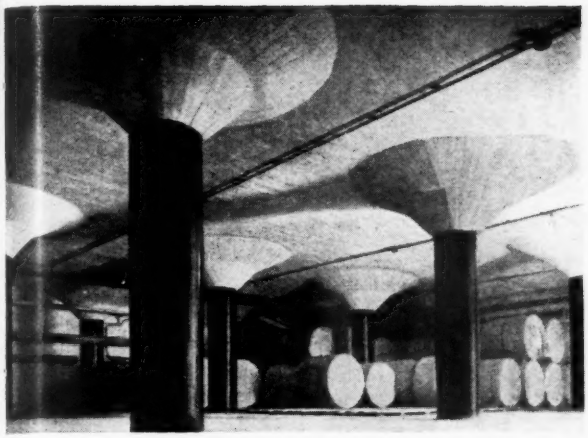
In this case, then, the industrialist is undertaking reconstruction mainly for capital stabilization and maintaining his market, rather than expenditure as an investment for return, and the problem arises of how far expenditure on a reconstruction programme can be incurred. Should the plant and its lay-out be the all-important problem, and the life of the building made only to match the useful life of the production plant it houses, or should we construct the building so that it exceeds the production life of the plant and is an asset of value always remaining?

I would suggest that in many cases the problem of the building should be treated independently, and in considering capital expenditure the value of the building as an asset should be carefully watched. This may mean some additional capital expenditure but, if capital stabilization is part of the object of the industrial scheme, the stabilization view-point should receive all the serious attention it deserves. A building which has only a break-down value in the open market when the production life of the plant which it houses has expired is a very poor investment, and in compiling production costs the whole of the building costs should be written off in the life of the plant if that is the type of building which is being put up. In most cases, however, it is not very difficult to consider the planning of an industrial building in relation both to the plant which it is to house immediately and its usefulness as a saleable industrial building for other purposes.

In this respect we link up our first point, the economic, with the second point, which is sociological. I am a firm believer in the provision of proper factory amenities in industry. These are not confined to welfare provisions; they must and do include the æsthetics, internal and external, of the places in which a man has to work. The imposition of mechanization and its rapid progress in industry have meant that the craftsman, in the form of a manually-skilled individual, is disappearing. The old craftsman found all his interest occupied in exercising his craft and had little thought for his immediate surroundings, bad though they were in some (but not all) cases; but with the advent of mechanization this interest passed, and the individual became more and more conscious of the conditions of his working life and had time to think—some might say that he was invited to think—of the amenities and provisions in the place of his employment. Loss of interest of the all-absorbing individual craftsmanship has helped materially towards a feeling of restlessness and dissatisfaction. We must try to replace this by some form of mass craftsmanship, in which the pride of a team replaces the pride of an individual.

In this, factory planning and factory buildings must play a very important part. We believe that the architect and the engineer face a very serious task in this direction. After all, why should not a steel or concrete structure look nice? This is a steel and concrete age. A large proportion of our population spend their lives in and around industrial buildings, and there is no reason why these buildings should not be just as pleasing in their own way as the public buildings in our great towns. Many employers have already tackled this problem vigorously and the architect and engineer have not been slow to seize the advantage.

Above all, the professional man must have his eyes on cost, and this is where we must exercise our skill, one against the other. Remember also that better planning and better buildings in industry are already showing themselves as the social desires which are in keeping with the trend of



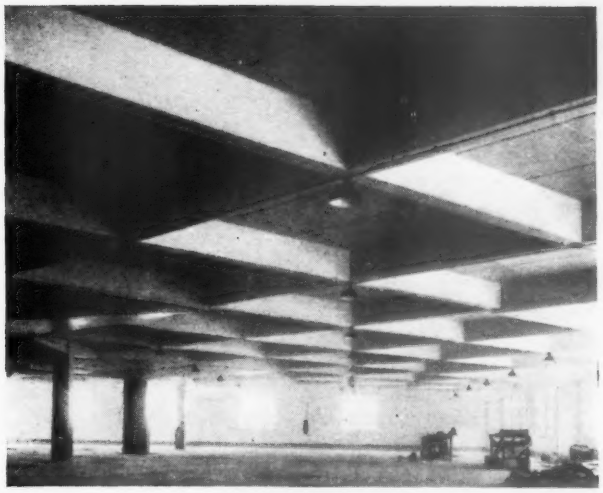


Fig. 3 (left): Flat slab construction Fig. 4 (right): Diagrid construction

thought over the last fifty years, and, with the transition of this thought into execution, are moving forward at an accelerating pace, so that one should attempt to value a building as an asset some fifteen or twenty years ahead. Then we must consider what effect the pace of this social demand may have on the value, and attempt, as far as possible, with the money available, to make provisions to that end. I suggest that a great deal of this can be done by careful thought and skill on the part of the architect and the engineer, without having to ask the employer all the time for more money.

If we judge rightly the social desires of the population interpreted in the need for better and more attractive industrial buildings, then I can not see how we can avoid employing a competent architect for all our factory work. Surely the diehard who thinks that ugliness is synonymous with cheapness is passing. We are a quality-producing and not necessarily a quantity-producing nation, and this fact should be borne in mind in dealing with industrial buildings.

Now let us turn to the engineering side. The attempt to achieve these ideals within the limits of the employer's purse calls for more and more advanced design and bolder planning, so that the structural material may be used to the greatest advantage. Continuous frames (often called rigid frames) and space frames become desirable, to give us the economy, and in the case of structural steelwork, welding helps in our outlines and details, as well as helping to save metal and therefore money. This type of design demands a high level of technical ability, for the designer must be able to undertake a complete statical analysis if the design is to be a real success. This level of engineering skill is not yet universally available, but the supply of technical skill is growing and as it grows we shall see greater and greater use of what is loosely termed modern structural technique. The ability to undertake a proper statical analysis of redundant framework has always been available to us, so that there is nothing actually new in the illustrations which I shall show you, but the theories underlying this type of design have been presented in more popular form, so that with the more universal absorption of this technical knowledge we find a growing number of examples of advanced framework and construction.

The type of structure adopted, and in many cases the materials used, will be dictated to a large extent by the functions of the building or structure. Considerations of heating, ventilation, natural lighting, maintenance, accessibility and so on, are all factors which have to be considered before structural plans can be set up. The building use and function are definite facts and will logically point to their own conclusions; thereafter, considerable skill is required on the part of the architect and the engineer to interpret these in such a way that maximum economy coincides with the most pleasing structure. At this point close collaboration between the architect and the engineer is essential.

Now let us consider various types of structure and comment on the trend of structural development today. The most common structural material in Great Britain still remains mild steel. With the advancement of welding and more careful consideration of outline, structural steel is gaining ground in esthetics. In the ordinary multi-storey building there is very little to be said about appearance, since in the main this framework is covered. From a design point of view, subject to good foundations, in which I include piles driven to a set, the rigid or continuous frame is by far the most economical. It is probable that in multi-storey office and warehouse buildings the high-tensile steel welded rigid or continuous frame, with precast concrete casings, will offer one of the cheapest structural solutions. In workshop buildings of the pitched roof type the open portal frame is gaining ground. This gives a nice, clean outline and maintenance costs are reduced. It is essentially an outline for welding, even though in quite a number of cases riveting is still used. The outline can be used on almost any type of foundation. The continuous redundant frame, commercially known as the completely rigid frame, is suitable only for good foundations, but the same outline with the two-pin or three-pin arch frame is a better solution for poor foundations where settlement is to be expected.

Fig. 5: Precast concrete multi-storey building, Manningtree

In multi-storey buildings there is not much yet to show in this country in structural steelwork apart from the simple beam and stanchion design, but there is no doubt that the welded continuous frame will supersede the simple design, and in the office type of building, where steel sections should be kept as small as possible, high-tensile steel should have a wide use. The continuous welded frame is not a new thing; it was used for a building in Turin in 1934. The availability of broad-flange sections, if and when the new universal beam mill of Dorman Long's is available to us, should go a long way to help the designer in economy of construction.

Mopin in his flat construction used a multi-storey portal frame which was completed as a frame when lying on the site and hoisted up as an entity into position. This light steel framework, however, dealt only with the transverse frames and was simple enough in standardized flat construction. It was used in the Quarry Hill Flats, Leeds, for which the architect was Mr. R. A. H. Livett and is illustrated in Fig. 1.

Local authorities have been very slow to accept the continuous welded framework, mainly because their bye-laws do not cover

Fig. 6: Steel framework, north-light factory, South Shields

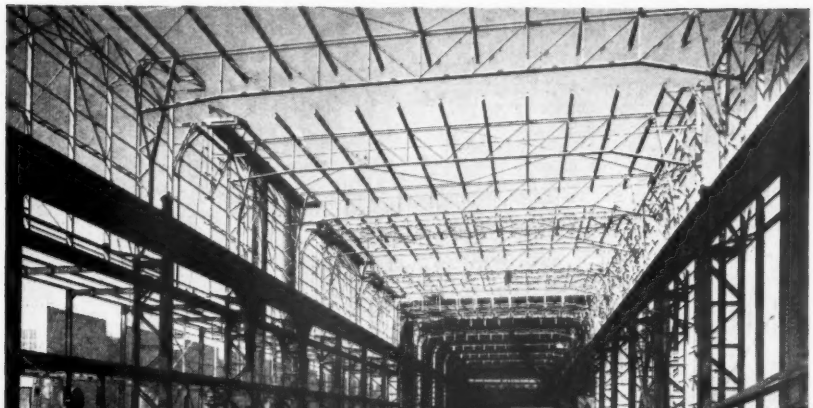


Fig. 7: Steel framework. Steelworks interior, Port Talbot

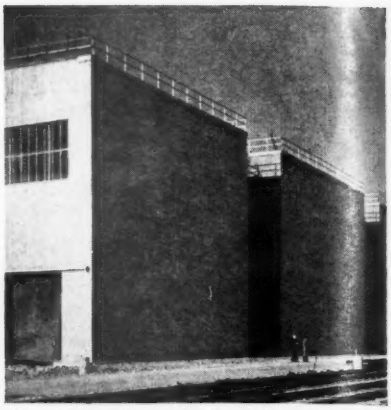


Fig. 8: Elevation, 'high-low' sheeted building exterior, steelworks, Port Talbot

this class of work, but it is now readily recognized by most of the leading local authorities in this country that this type of construction is better and more economical than the conventional type, and permits or waivers are granted for it.

An interesting example of multi-storey framework of recent construction is the Nylon Spinners' factory at Pontypool, shown in Fig. 2. Here we have welded stanchions made up of plate for continuous girders to go over them. The very fine welded stanchions were intended to be exposed to view in the original scheme, and carry the continuous riveted girders which pick up the secondaries. The arrangement of welded and riveted construction, I understand, was to meet the manufacturing availability at the time. That is a real step forward in the use of welded stanchions and continuous girders. The architect was Sir Percy Thomas.

In reinforced concrete the use of continuous framework, even though based on very empirical formulæ, has been admitted by bye-laws, and in fact insisted on, for some time, so that in this respect reinforced concrete design is in advance of structural steel. Flat slab construction (Fig. 3) sometimes called mushroom construction, was fairly common before the war. It is a neat construction for warehouse and store buildings and shops, and is a very cheap construction. The principle of the construction is, of course, to do without any beams. In some jobs in America the columns have been taken straight up to the underside of the slab with no enlarged head at all. A steel frame-beam was embedded in the concrete slab just over the top of the column to bring the loads back on to the column head and deal with the heavy shears in the concrete slab immediately over the column heads.

The Diagrid construction shown in Fig. 4 is less frequently met with. It is an advanced design which was used in a number of cases before the war. It is rather costly. With the advance of prestressing this may have a greater use. It is a grid frame with beams spanning in both directions and it can open up in very big spans, a comparatively shallow depth of beam covering bays of 40 ft. or even greater.

For general economical work the ordinary beam and slab type of construction in reinforced concrete is probably the best. It is easy, cheap and fairly clean. This type of construction has been projected into the realm of precast, and considerable strides have been made in precast in this country. The value of this is in the high quality control which can be maintained with this class of work. There are very few good examples of industrial construction in precast continuous reinforced concrete framework anywhere in the world, but Fig. 5 shows one of a number of buildings in this country using precast rigid or continuous framework. The columns are precast and the beams are precast. All the slabs are of precast units, finished off with *in situ* topping to give a solid floor. Precast slabbing was also used for the staircases. The building is in Manningtree, and the architect was Mr. Martin Slater.

In this class of work we are probably in advance of the rest of the world. It has the advantage of using a minimum quantity of steel, which so pleases the Ministries today —outside the use of prestressing, of course— and it also involves a minimum consumption of timber and labour; there is very much less call on labour on the site to deal with this class of work. In this type of work, however, the selection of joints, and the positioning of joints under the types of load that have to be designed against, call for considerable skill and experience. There is little doubt that this sort of construction will be much more wide-spread in the near future. Probably prestressing will be superimposed on it and the type of construction will advance. I think it is possibly the cheapest form of construction in reinforced concrete for buildings of the type for which it is suited.

Next we come to single-storey buildings, and here we have a very wide range of engineering interpretation, due to the opinions of individuals or governed by the specific demands of the building. The single-storey building is possibly the commonest of the industrial buildings, and in the main can be sub-divided into two classes: (1) the plain industrial building which does not carry overhead cranes—the simplest type of all, and (ii) the industrial building carrying

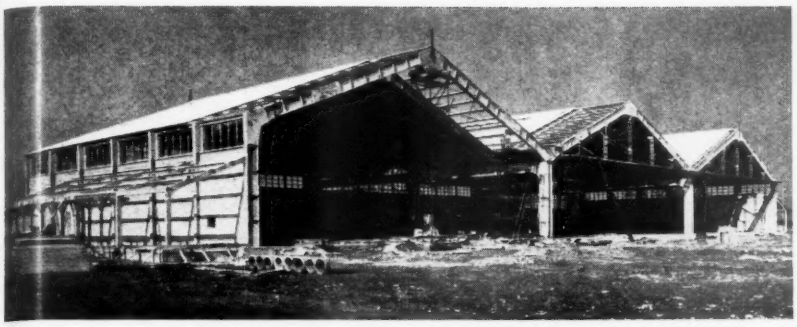


Fig. 9: Precast concrete hangars, Bretigny, France

Fig. 10: Precast concrete. North-light factory, Gillingham

heavy or light overhead electric cranes. The design basis of these two types is quite distinct.

For the more simple buildings without cranes we can have the ordinary pitched roof, the flat roof or the north-light outline. With the pitched roof the open portal frame is gaining popularity. I have heard in many quarters that you can not construct an open portal frame for the same price as an ordinary roof truss, but I do not think that this is true. It depends a great deal on the skill of the designer and whether he knows how far he can go with a complicated design and understands what happens in a redundant framework. It may be that on very small spans the light bolted truss is still the cheapest job, but I do not think that that is so on the usual industrial spans.

In the single-storey building without cranes, since we are dealing with buildings which have no racking or lateral forces, there is probably nothing between the two types with regard to life, and it does not matter whether you use an open portal frame or a roof truss job. The open portal frame, however, is very much cheaper to maintain than the roof truss job; painting is much cheaper on a job where most of the steelwork is gathered together and larger sections are used.

Where head-room is decided solely for the benefit of the occupants it is possible to reduce the eaves level of the building, using the open frame, and still provide an impression of greater ceiling height than is possible with the use of roof trusses, where the multiplicity of bottom ties gives a false impression of a ceiling level.

A variation of the pitched roof is used in the case of the Bayliss, Jones and Bayliss factory, shown in the handbook, and this may be taken as an indication of how far the engineer—or perhaps, I should say, the architect, on this job—is going with the use of open rigid welded framework. It is a nice, clean, open job. Its outline was defined to give certain daylighting effects inside the factory under all conditions of sunlight outside, and the architect, Mr. Howard Crane, has paid very careful attention to that point.

In the case of the north-light type of roof, the conventional outline is very familiar to us, particularly in the standard factories which have been built up and down the country by various Ministries. In most cases we have the usual untidy mass of roof framework cluttering the whole of the roof space, but it is possible to have north-light construction with all the framing confined to the slope of the rafters. The girders are laid in the rafter plane both for the north slopes and the south slopes, and there is no steelwork inside the building except in one longitudinally-braced bay. This is an easy solution for big spans without having a multiplicity of framing, and it is clean and light. The main members of each truss frame which lie in the rafter plane are jointed with a rigid joint at the top and at the bottom, so that up and down the slope you get a continuous framework. That is a very light type of structure and rather flimsy to erect, but once it is up it is probably stronger than the conventional type. The example in Fig. 6 is of a north-light factory using this system. The architect was Mr. Evan Morgan. If necessary, on the north face you can have a vierendeel girder and cut out the sloping bracing, but that type of girder is of course more expensive.

There is not much to be said about the flat roof single-storey industrial structure except that when the building houses cranes the continuous framework has a marked superiority over the more simple design, because it gives greater rigidity of structure and greater ability to absorb energy and to maintain crane track lines.

In the other single-storey buildings which we have just discussed some advantage may be found from the point of view of economy by the use of high-tensile steel, particularly in a welded frame, but for buildings which have to withstand considerable longitudinal and lateral forces, as when housing cranes, the advantage of the use of high-tensile steel may not be obtained. In a properly designed building of this type, using continuous frames and continuous crane girders, which is the ultimate ideal for this type of structure, consideration must be given to the inertia of the framework in relation to its ability to absorb the energy of the forces imposed on it. In buildings subject to continual abuse in the working process, such as foundries, steelworks, heavy machine shops, etc., careful attention must be given to the mass inertia of the members and of the building as a whole, or the building and crane tracks will be an endless source of trouble.

We can have buildings with cranes using the simple roof truss and cantilever stanchions, and also an open portal frame carrying crane tracks. Or we can have the modern all-welded frame building with crane tracks using a flat roof with a high-low outline. In the example of the latter shown in Fig. 7 the rigid frames rise out of fixed bases with different inertias right round the structure. The main frames are spaced 40 ft. apart and the purlins are ordinary plain joists cantilevered over the frames with slings down at each end which pick up the low level roof. The architect of the example I am taking is Sir Percy Thomas. It is a remarkable example of the treatment of an ordinary sheeted building (see Fig. 8). From an engineering standpoint this is nothing more or less than a tin shed. The flat roof is an aluminium deck with bitumen sheeting covered with stone for protection. The architect painted the 18-gauge galvanized sheeting at the sides a yellow colour which matches the sand dunes adjacent to it, so that the building seems to fit in with the landscape very well indeed. The glazing in the roof is in the drops between the high and low roof, but to even out the lighting inside the building the architect has used deep vertical windows to within 8 ft. of ground level, and to give an architectural effect has turned them over at the top.

On this particular building the roof covering was a fairly expensive item, and I think that this is the first building of its type which has been erected in this country. I was giving a talk recently in the North of England and showed a picture of this building, and somebody said after-

Fig. 11: Barrel vault framing. Belfast

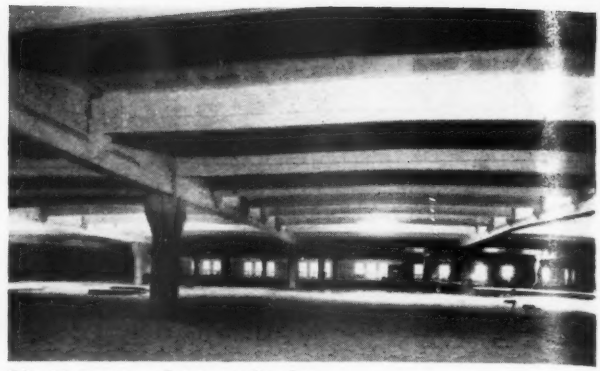


Fig. 12: Prestressed concrete framing

wards 'How much have the æsthetics cost you on that job?' He thought that an ordinary pitched roof job with a cheaper roof covering would be the better type. If a pitched roof building had been used on this particular job, with multi-span bays, it would have necessitated internal drainage, and in the case of internal drainage for this building it would be necessary to go 20 ft. down, and in some cases 26 ft., to clear the foundations. That would cost a great deal of money—more than was actually spent.

In this case rainwater is collected on the outside face only of the building in a concrete channel along the bottom of the building. The alternative would be to have a pitched roof and spend the money on drains; here you have a more efficient drainage system, there is no trouble with water inside the building, the result is much better looking, and it costs a few pounds less.

On this job the crane girders are continuous right through. They are braced in the centre in a rigid bay, and the whole building is allowed to expand outwards from this centre rigid bay. Above crane girder level, to maintain the position of the roof, which is really articulated, the building is hinged longitudinally at crane girder level and is stiffened transversely against racking forces, so that the crane stanchions can bend outwards from the rigid bay up to crane girder level, and the whole of that structure above crane girder level remains vertical. Inside the building there is very little variation in daylight intensity all along; the vertical windows to which I have referred seem to be very successful, matching up with the roof.

In reinforced concrete single-storey buildings little has been done by the *in-situ* method, mainly because it is so costly, but with precasting a number of methods have come into being since 1939. The very simple type of Ministry of Works hut is familiar, but this is limited to small span jobs. Some of the later developments in the use of precast reinforced concrete framework in single-storey buildings are in resting, and use both the ordinary pitched roof and the north-light roof.

Some hangars have been constructed in France to the design of British engineers and Fig. 9 shows an example at Bretigny. An example of a north-light roof factory is shown in Fig. 10; the whole of the framing was done in precasting, with the downpipes cast inside the columns on the inside of the building. The architect was Mr. Joseph Emberton.

Another type of framing in reinforced concrete is the barrel vault or dome type, an example being a leaf-sampling room in the tobacco works of Messrs. Gallaher of Belfast, shown in Fig. 11. This type of construction gives a nice, clean outline, and on any job which is of large size the construction can have a magnificence of its own, but I feel that the barrel vault is an expensive type of roofing. It may be widely used, but I usually find it difficult to get over the question of cost. It fulfils, however, a particular function in industrial structures.

In reinforced concrete construction, prestressing has come very much to the fore recently, and has received much support from Ministerial circles because it is expected to save tremendous amounts of steel. More work has been done on the continent in prestressed work than in this country. There is a big future for prestressed concrete structures, but a great deal of work has to be done before their application can be general and before the cost of this form of construction can be made competitive. It is applied in the main to precast work at present mostly involving simple design, and Fig. 12 shows an example. Not much has yet been done in providing continuity. One advantage of prestressing is where you have an industrial structure which is subjected to a very severe, aggressive atmosphere, and where the elimination of hair-cracks is an important point. It is possible to treat the face of the concrete against acid fumes and so on successfully, but if hair-cracks open up there will be an attack inside the beam, particularly against the steel. Prestressing eliminates that.

A good deal of work has been done in prestressing for bridges on the continent, but the engineer is beginning to run amok on these bridges and to over-emphasize the fact that he can make a deck beam more slender than anyone else, irrespective of what it looks like on the job. It is no doubt an engineering achievement, but the layman does not understand that and wants something which is nice to look at.

Lastly, I should like to mention aluminium as a structural material. A fillip has been given to the use of aluminium in structural framing due to the shortage of steel. It has a limited field of application but it is suitable in aggressive atmospheres, particularly in chemical works, where steel would corrode badly without a high level of maintenance. It can look nice, but it is not a cheap material to build in. In much of the work done up to now in the form of the roof trusses, in order to use aluminium, an expensive material, to its best advantage, the outlines are marred by a multiplicity of small members, which is a step in the wrong direction. Aluminium suffers from the disadvantage of having a comparatively low modulus of elasticity, one-third of that of steel, so that the deflections are greater, and in large spans consideration must be given to the spread of the truss as the load comes on to it. It costs a good deal more than steel—depending on the structure, between 30 and 50 per cent more as a general rule—but with careful design and planning can sometimes be brought more into line with steel costs. It has the great advantage that it requires no maintenance, and in some cases the inaccessibility of structural material for anti-corrosive maintenance suggests the use of aluminium.

The framing of the Botanical Gardens in Washington, an old building, was done in aluminium; the main girders are in heat-treated aluminium and duralumin, and the purlins and small members in high-tensile aluminium alloy. Another example of the use of aluminium is an American railway bridge which has aluminium and steel spans, the span being 100 ft. The aluminium weighs 53,000 lb. and the steel 128,000 lb. With aluminium it is necessary to use frame work in order to reduce the total weight of the metal; the metal costs more than the labour, so that fabrication costs can be incurred to a greater extent than in steel. The two-leaf bascule bridge over the River Wear recently opened by Mr. Barnes is all done in aluminium, and in a moving part such as that there is no doubt that aluminium has some advantage in relieving the power required.

The Building Productivity Team

The following statement was issued by the team representing the British Building Industry on their return from the United States where they had been studying the American Building Industry. The representatives nominated to the team by the R.I.B.A. were the President, Mr. Michael Waterhouse, M.C., and Mr. R. H. Matthew [A], Architect to the London County Council.

IN THE SIX WEEKS of our tour we have examined as thoroughly as possible the organization, constructional techniques and general outlook of the American building industry in Washington, New York, and the industrial centres of Chicago, Detroit, Cleveland, Buffalo, Boston and adjacent districts. Our object has been to compare American practices with our own to see if we could bring back any recommendations to help our industry at home to increase its efficiency and reduce its costs, thus assisting directly our export industries which need new buildings and our housing programme.

Our team consists of architects, quantity surveyors, contractors, a specialist contractor and operatives. We have thus been able to cover a particularly wide field in our examination of the contribution which can be made by each section of the industry to greater productivity.

We have been greatly impressed by what we have seen in design, in the organization of work both before and after the contract is placed, in the availability and use of materials, and in the outlook of each individual member of the building industry, all tending towards greater efficiency, greater speed and lower costs. We have made particularly detailed review of the cost of building in America; our quantity surveyors have analysed the costs of a large number of separate contracts, and we have found that the overall cost of building in the United States at the present time is approximately 55 per cent to 80 per cent above that in this country.

An important part of that figure is, of course, made up by labour costs, as the average rates of wages in the United States are rather more than four times our own; this means that there must be an appreciable saving on the other items. We have investigated the methods by which these savings are secured. Chief among them is the fact that, whereas we are yet handicapped and frustrated by shortages of various essential materials, whether they be still subject to official control or not, there is in the U.S. an abundance of all kinds of building materials and fittings, timber, steel and other metals, heating fittings, and so on. This means that the building contract can be planned down to the delivery and fixing of the last item. Everyone connected with the job knows what the target is and knows moreover that with good organization and hard work from all it can and must be achieved. That is a position which we would all like to see in this country, and, until it can be regained, everything else is but a palliative.

The incentive thus given to speed and efficiency is reflected in the output of the individual operative. In the United States the average production per man hour is 50 per cent more than in Britain. This does not mean that the American worker necessarily works at a 50 per cent higher speed or puts into his work that amount of increased physical effort. All the other factors —design, materials and contract organization—help him to achieve that figure, but it is our conclusion that, for these and other reasons which will be enumerated in our report, the American workman is enabled to, and does, work more effectively than the British workman. We believe that he puts everything he can into his work without holding back. The tempo of the job is fixed from the commencement like a machine belt in a factory and each one who does not keep up to the line, in whatever capacity he may be engaged, is rejected. The direct material incentive is the high rate of wages of the building trade craftsman, which is one of the highest skilled rates in American industry, from which he is able to maintain, while in employment, an extremely high standard of living, related to a cost of living which, while differing in detail from our own, we found to be lower than we had expected. The individual to maintain that standard of living must keep his job. Despite the large amount of work in progress there was a pool of unemployment in most of the centres we visited, and everywhere we went we were told that individual productivity had varied over a period in accordance with the rise or fall in the number of men seeking work. It is now definitely on the up-grade. American unemployment benefits are not paid nationally and in general they represent a far smaller percentage of the normal weekly wage than in this country. If a man loses his job, he is in danger therefore of losing his automobile, his refrigerator and possibly his home.

The same considerations apply in each of the other sections of the Industry. The architect must be and is in general a completely efficient business machine, experienced in the same hard school as the building contractor. The contractor, like the architect, has to live in a highly competitive world; competition among them being keen both in cost and in time. The sub-contractors and specialists, more highly developed than in our country, are compelled to co-operate to the full with the main contractor and with each other, or the job will not be successful. Each not only has his incentive, but also can not afford to risk failure. While there is greater scope for successful trading, there is also greater scope for failure, and the American State provides no feather-bed for failures.

We have seen many points of great interest in the technical field. The extensive use of cinder blocks as backing for exterior walling, asphalt shingles with a life of 15 or 20 years as a cheap and efficient roofing material, the minimum use of scaffolding, representing vast savings, and the use of ready mixed concrete. Plant and equipment of all types is readily available. We saw nothing particularly new in heavy plant or hoisting machinery—indeed, in some of these respects we are further advanced than the Americans—but there were no shortages, whereas many British contractors are still unable to obtain the equipment they require. Machinery was used on the job itself to a greater extent to cut and shape materials, representing a saving in labour and transportation costs.

We have studied American methods of homebuilding, both by public bodies and by private enterprise. A far greater proportion of the total demand is met by the private housebuilder than in this country. There are no restrictions upon his activities and he is doing a great work. For example, the average skilled workman in industry can afford to buy his own home, and this is a great inducement in itself to productivity. The amount of Federal and State Housing and financial assistance is, however, increasing. An important difference in housing is the great advances which the Americans have made in the design and installation of central heating in all types of houses.

To sum up, we have found nothing to undermine our conviction that, provided our building industry at home can be supplied with adequate materials and labour, and provided that everyone, from the top to the bottom of the industrial ladder, can be given that essential incentive to personal effort which the Americans possess and enjoy, the British Building Industry can equal the American industry in its efficiency. These factors are, however, all important, and some of them are outside the control of industry itself or indeed of the British Government actions alone. The industry must, however, strive to achieve that spirit of initiative which the Americans display and must not allow itself to be numbed into mute acceptance of present conditions and practices as something inevitable and enduring.

The Team as a whole is unanimous in recognizing how great a privilege it has been for us to have this opportunity of examining a great and progressive industry. There can be no doubt that the Anglo-American Council on Productivity has conceived a great idea in sending teams from various industries across the ocean. We can assure British industry from our experience that the American industrialists, management and labour alike, are willing and anxious to receive their representatives and to give them full opportunities for seeing everything they wish to. We received the utmost assistance, and the greatest hospitality, from the moment we landed until we left, and the Economic Co-operation Adminis-

tration, which organized our tour, the American Institute of Architects, the Associated General Contractors of America, the American Federation of Labour, and the National Association of Homebuilders are all entitled to our most grateful thanks.

We are now making good progress with the preparation of our report, which will contain our detailed conclusions. It is not possible at the moment to give any date for its appearance because we have been so fully occupied with our visits to building sites and to architects, contractors and Trade Union offices that we had little time until we joined the ship of considering our conclusions or even of reading the vast amount of printed matter which we have collected. Every effort will, however, be made to prepare it as quickly as possible, and we hope when it is ready to arrange for members of the team to attend meetings of the industry in all parts of the country. It will be our object to try and infuse into our industry at home the spirit of personal initiative which we met in the United States in the hope that thereby we may overcome our present difficulties.

Practice Notes

Edited by Charles Woodward [*A*]

MINISTRY OF TOWN AND COUNTRY PLANNING. The Minister has now made the Town and Country Planning (Control of Advertisements) Amendment Regulations, 1949; (S.I. 1949, No. 1473, H.M. Stationery Office, 1*d*.). Regulation 5 raises the maximum size and number of contractors' or sub-contractors' boards that may be displayed on building sites without the express consent of the local planning authority. On each road frontage of the site one advertisement of up to 20 sq. ft. in area may accordingly be displayed in respect of each contractor or sub-contractor carrying out work on the site.

These Regulations amend the Town and Country Planning (Control of Advertisements) Regulations, 1948. Regulation 4 adds to the kinds of advertisements which a local planning authority may permit to be displayed in an area which has been defined by order as an area of special control. Regulation 5 extends the permission already granted for temporary advertisements of Class III by raising the maximum size and number of contractors' boards which may be displayed on building sites without the express consent of the local planning authority (new sub-class (*c*)), and by including, among the kinds of local activities that may be publicised without express consent, events and activities of a political nature (new sub-class (*d*)). Regulation 6 (1) amends the definition of 'business premises' so as to include buildings used for the provision of services, whether for profit or otherwise, and to exclude, except in specified circumstances, buildings designed for use as dwellings. Among a number of minor and procedural amendments Regulation 13 requires a local planning authority, when seeking the Minister's approval to an order defining an area of special control, to make available for public inspection, together with a copy of the order and map, a copy of the statement of reasons which they submit with the order to the Minister.

The Ministry has issued Circular 73 (1949), which contains a Model Form of Purchase Notice under Section 19 of the Town and Country Planning Act. Authorities are recommended to provide copies of the Form, or one substantially like it, for the use of persons intending to serve notices under the section; (H.M. Stationery Office, price 1*d*.)

At a recent meeting of the Town Planning Institute the Practice Notes of the Central Land Board were discussed. One question raised the point that if a large Victorian dwelling-house, in being on the appointed day, was brought into use as two separate dwelling-houses, was such a change of use within the scope of paragraph 2 of the Third Schedule to the Act (and thereby exempt from development charge) if the transformation of the house was by means of a vertical division producing two houses side by side instead of the more usual horizontal division which produced flats piled on top of each other.

The Chairman of the Central Land Board replied that under the Third Schedule there were rights of rebuilding and 'improving' a building. In order to come within the schedule it was necessary to do one of these two things. In his view, you were not within the Third Schedule in dividing the house as stated so as to make two buildings, but if you *altered* it you were. Until they were told they were wrong, the Board proposed to construe the word 'building' in the singular and say 'Would anybody call it rebuilding, or building, or the creation of a new proposition?'

MINISTRY OF HEALTH. Circular 75/49, dated 15 August 1949, addressed to housing authorities in England, deals with the conversion, maintenance and repair of requisitioned properties; £250 is now the maximum estimated amount which may be authorized on the certificate of the local authority's technical officer without obtaining the prior approval of the Principal Regional Officer. This revises Circular 49/44, paragraph 10.

£100 is now the limit within which local authorities may carry out repairs without the Department's prior approval. This revises Circular 138/47, paragraph 1 (2) and (3).

Circular L.R.L. 6/49, dated 19 August 1949, addressed to the L.C.C. and other housing authorities in the London Region, concerns late notification of war damage to properties under requisition. The War Damage Commission are not prepared at this late date to accept liability for repair of war damage to requisitioned property without regard to the fact that notification had not been made. Where, however, the property was under requisition at the time of the War Damage or requisitioned very soon afterwards, special consideration will be given provided the *owner* makes an approach to the Commission while the property is under requisition or within a reasonable time of derequisitioning. Owners of such property which are not to be repaired by the Council should be advised at once to communicate with the Regional Office of the Commission if all war damage has not been notified.

Where a property was under requisition at the time of the damage, or requisitioned shortly afterwards, and is still held, the Commission will consider an application *by the Council* if a specification of all war damage repairs is furnished. Form C.I. should be completed and sent with the specification to the Regional Office of the Commission in respect of each property, all applications concerning properties in one street being sent together.

After inspection the *Council* will be advised of the items of damage in respect of which the Commission will accept a claim. These items will be limited to those which the Commission's Technical Officer is satisfied beyond all reasonable doubt are due to war damage and which are still unrepaired at the time of the inspection. If the *Council* agree to the notification the Commission will not consider a later application from the *owner*. He should, therefore, be consulted and if possible agree the specification with the Council.

MINISTRY OF WORKS. A reduction equivalent to 2½ per cent of the basic prices of tanks and cisterns manufactured by members of the Associated Tank Manufacturers has been confirmed by the Minister of Works. The new plusage is 65 per cent on basic list prices and concerns all deliveries made on and after 15 August 1949. (M.O.W./93/49. P.I.73.)

CORPORATION OF LONDON AND WAR DAMAGE REPAIRS. Town and Country Planning Act, 1947. It does not appear to be generally known amongst members that the Direction made by the Corporation of London under Article 5 of the 1945 General Development Order is still continued in force by Article 4 (5) of the 1948 Order, in so far as that Direction relates to war damage repairs.

The effect of this Direction is that where it is proposed to carry out war damage repairs to a building in the City of London exceeding £300 in aggregate cost, planning permission must first be sought.

Failure to appreciate this fact has resulted in a number of war damaged buildings being repaired at considerable cost when in fact, had planning permission first been sought, such permission would have been refused on the grounds that the sites of the buildings were required for the proper redevelopment of the area in which they were situated. In such cases, when subsequently planning permission has been

sought to retain the works, the corporation has found it necessary, in the public interest, either to refuse consent, or to limit the period consent, either course resulting in financial loss, both to the developers and to the corporation.

The attention of members is drawn to these facts, so as to assist in preventing future abortive expenditure and loss of public funds.

MAXIMUM SELLING PRICE OF NEW HOUSES. In Practice Notes, July 1949 JOURNAL, it was stated that the maximum selling price of a new house should be fixed on the basis of the actual expenditure incurred by the owner. A question was raised as to whether development charge should be taken into account, and the Ministry of Health now agree that the maximum selling price should include: (1) Cost of building, (2) cost of roads and sewers, (3) restricted land value, (4) development charge. Where the exact amount of the development charge is not known, a clause to the effect that any development charge payable may be added to the maximum selling price should be inserted on the licence. As previously stated any fees and charges incurred, or to be incurred, by the owner should be taken into account.

The Housing Act, 1949, extends the control of the selling and letting prices of new houses until December 20th, 1953. The Act also provides by Section 43 that if a licensed addition is made to a house which is controlled as to selling and letting price, the owner can make an application to the local authority to increase these prices accordingly.

CENTRAL LAND BOARD'S FIRST REPORT. This Report covers the activities of the Central Land Board up to 31 March 1949, and is obtainable at H.M. Stationery Office, price 4*d*. net. It sets out the organization of the Board, the arrangements made for claims on the £300 million for loss of development value and those for assessing development charges. On the subject of private transactions in land for development, the Board say they regard it as vital that developers should not have to pay twice over for development value, i.e. once in the price of the land and again in development charge. They noted with concern that after the Town Planning Act came into force, land was still being widely offered and taken at prices including full development value. Later, they say, there has been some improvement.

Where land is deliberately being offered for sale at a price above existing use value, the Board consider whether it would be in the public interest for them to purchase. They report that their policy so far has been to select a certain number of typical cases for compulsory purchase as a warning to owners of land in general.

The Report contains statistics of applications to the Board to assess development charge, and of amounts received in various types of cases.

THE LANDS TRIBUNAL ACT, 1949. This Act received the Royal Assent on 14 July 1949, and the new Tribunal set up under the Act will have transferred to them the jurisdiction hitherto exercised by Official Arbitrators. A day is to be appointed from which the change will be effective.

The Tribunal will hear appeals from the determination of development values under Part 6 of the Town and Country Planning Act 1947 in addition to questions of disputed compensation under the Lands Clauses Acts, cases under section 84 of the Law of Property Act, 1925, and appeals in rating cases under the Local Government Act, 1948.

A decision of the Tribunal will be final subject to a right to have a case stated for the opinion of the Court on a point of law.

STAMPING AWARDS. The Finance Act, 1949, which received the Royal Assent on 30 July, exempts Awards from Stamp Duty; The exemption was effective from 1 August 1949, and includes Party Wall Awards. The Act also repeals excise licence duties hitherto payable by appraisers, auctioneers and house agents.

Correspondence

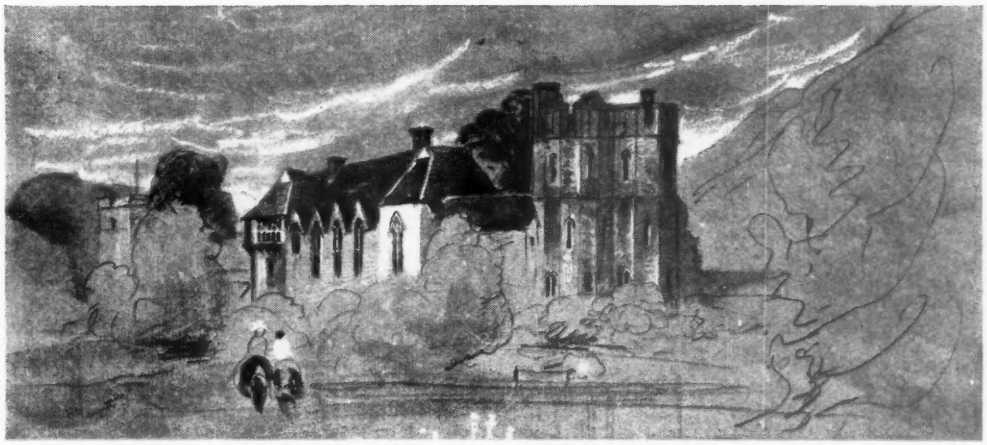
MEASURED SYMMETRY IN ARCHITECTURE

Sir,—With reference to Mr. Hunt's article on Measured Symmetry in Architecture, I can not agree that symmetry is being neglected by modern architects on any such arbitrary grounds as he suggests.

The number of buildings that lend themselves without distortion to symmetrical treatment is remarkably few, even without consideration of siting, and the accent created by symmetry is so great that, unless it is reserved for buildings of some significance, it is reduced to purposelessness by conflicting claims to domination.

It may even be questionable whether any modern buildings justify the accent placed on them by symmetry. Banks, cinemas and town halls all play, at best, a pedestrian part in our lives. How many modern buildings have a significance comparable to that of the mediæval church or the Grecian temple and, like them, are worthy of the strongest accent in the architect's vocabulary?.—Yours faithfully,

H. D. KRALL [STUDENT]



A reproduction of Peter de Wint's original drawing of Stokesay Castle, Shropshire, one of several Peter de Wint drawings recently purchased by the R.I.B.A. and now in the R.I.B.A. Library

Building in Rajputana

By G. A. Goldstraw, B.A. [*A*]

Mohammed, Son of Ishaq. A typical Jodhpur contractor

RAJPUTANA HAS RECENTLY BEEN NEWS. This vast area, lying between Pakistan-Sind and Central India, for centuries divided into many separate and independent States, is now to be welded into one province of the new India and to be called Rajasthan.

The territory of these states is economically very poor, mainly flat scrub-desert with a sprinkling of hills of sand or hard bare rock. Rainfall averages annually between 5 in. and 20 in. as one moves from west to east. Periodically the monsoon falls well below the meagre average; and should this happen for three consecutive years, severe famine follows, thousands of cattle die, and the population migrates from the areas worst affected in spite of much effort and expenditure on famine relief. Wide sandy river beds occur frequently but only during the brief monsoon in July and August can they be called rivers. Road bridges are rare; causeways are adequate.

A steady effort has been made over centuries in the construction of dams and feeder channels to provide 'tanks' (reservoirs) for irrigation in the long, dry, hot weather, but evaporation takes a heavy toll. Small tanks frequently dry up completely and larger ones lose from eight to ten feet of water yearly entirely by evaporation.

Yet, in spite of severe 'environmental resistance'—as William Vogt may perhaps call it—villages are widely dispersed and each of the larger states has at least one city with a population of from one to two hundred thousand. Most of the capital cities are well known—Jodhpur, Jaipur, Bikaner, Udaipur—and before the war they attracted many cold-weather tourists.

The Rajputs are of the warrior caste and for centuries in the past have fought frequently either among themselves or against the common enemy, the Moghul; their cities are therefore fortified with walls and dominated by fortress-palaces.

Nature has, however, been surprisingly generous with building stone deposits; sandstones, marbles, granites and rhyolites are to be found in many areas. At Jodhpur there are quarries of pink-buff sandstone which Dr. Lanchester described as equal in every way to the best building stones he had seen. The architectural effect of these cities—built mainly of one type of stone in one steadily developing style, with buildings crowded together inside the defending walls and divided by narrow winding streets which open out occasionally into little squares—is very fine indeed. To an architect, cities in other parts of India hardly bear comparison with them. The late Colonel Charles Waddington sketched and described many of these Rajput cities and called his book *Indian India*.

The more spectacular buildings of the capitals have been photographed and may be fairly well known, but there are many smaller cities either remote from the railway or at the end of branch lines which excite curiosity when studying a map. Reliable information about their architectural interest is almost impossible to get, but a visit is usually well worth while if the locality is known merely to possess sandstone.

In the capital cities it rarely happens that the fortress-palace contains the buildings of greatest architectural quality. Perhaps the desire for elaboration and to possess rooms in the latest phase of the style may have led many of the ruling families of the past to alter or rebuild their 'dwellings'. Consequently it is usually among the merchants' houses in the older quarters of the city that the best work is found.

With the building of the cities have grown up schools of skilled masons, the craft being handed on from father to son. These 'pools' of skilled labour were drawn upon by the Moghul emperors for their great building projects at Delhi, Agra and Fathepur-Sikri. With the decline of the Moghul power many of the masons moved back into Rajputana and were employed by the maharajahs on their cities and fortress-palaces, a fact which accounts in some degree for the spread of the Indo-Saracenic style. In recent times this flow and return was repeated in the case of New Delhi; after completing the masonry work there, many masons returned to Rajputana and 'settled' on the construction of the palace for the Jodhpur Maharajah, where the quality of the work owes much to training received under British foremen at New Delhi.

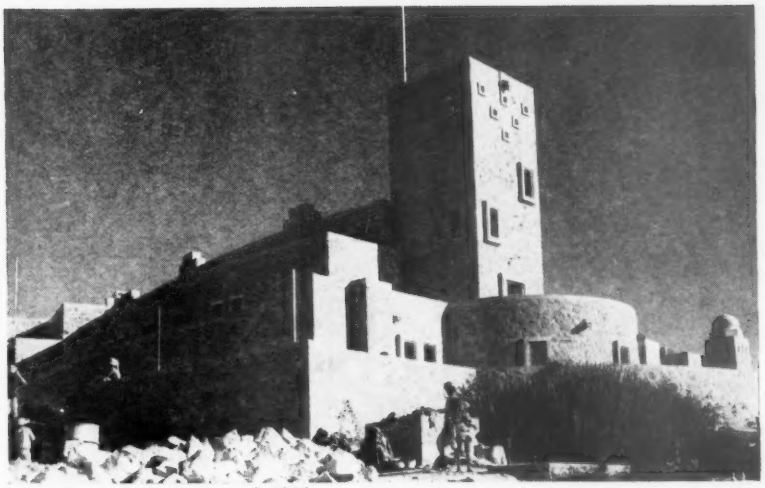
Since the latter half of the 19th century British architects have frequently been consulted for advice and drawings for palaces, hospitals, colleges and secretariats in the Rajput States, but very few of their schemes appear to have materialized. There are cases in which the Indo-Saracenic style has been stipulated by the client and consequently little evidence of the designers' origin is seen. The name of one Englishman however is still a household word as a builder among the Rajputs, although his works were completed more than half a century ago, Sir Swinton Jacob, officially designated 'Engineer to the Jaipur State'. During 34 years service in the Public Works Department he was responsible for many large buildings in various States of Rajputana, in Central India, and the United Provinces, and may be said to have been the founder of what proved to be almost an Indo-Saracenic Revival. His buildings were very faithfully detailed in this style and were often massed with great skill into very picturesque compositions.

His staff of apparently enthusiastic and competent Jaipur draftsmen measured and drew many temples and tombs—no mean feat—and innumerable details of old domestic work which were assembled into a portfolio of 10 volumes published as *The Jaipur Portfolio of Architectural Details*. Copies of the first seven volumes were presented to the R.I.B.A. Library by the Maharajah in 1890 (see proceedings of the R.I.B.A. reported in THE BUILDER, 24 January 1891).

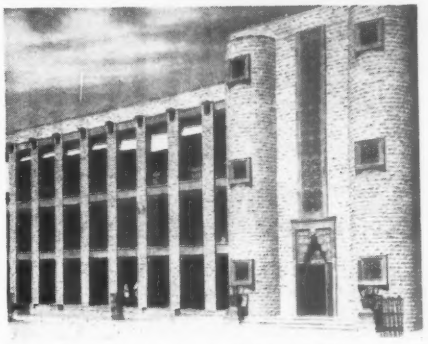
His most remote work appears to be the State Guest House for the Maharawal of Jaisalmer—a city which is still about a hundred miles from the railway. Architects who have seen the domed Darbar Hall, of what used to be the Viceroy's House at New Delhi, may have noticed that the yellow marble Doric columns, about 50 ft. high, are built up of drums only 4 in. thick. These drums were quarried at Jaisalmer and had to be carried to the railway by bullock carts. It is amusing to think that even Sir Edwin Lutyens had to adjust his details to suit bullocks. Sir Swinton Jacob's original small-scale drawings for the Court's Building at Jodhpur has marginal notes in pencil such as 'See Vol. V Plate 32'—with a line drawn to a special window head. By such reference to 'The Portfolio' he evidently saved himself the trouble of preparing detail drawings.

In recent times State engineers in charge of Public Works departments have devised designs, or used type drawings by their predecessors, for the very numerous ordinary buildings required year by year—State department offices, schools, dispensaries, district courts, custom houses, police stations, and bungalows for officials. As engineers their main and very considerable responsibilities have been water supply, irrigation, dam construction, roads. (At one time the P.W.D. engineer at Jodhpur was also the Jodhpur Railway Manager.) It is therefore not surprising if their building work is uninteresting to an architect. In countries where the monsoon rains are so vital, the engineers' skill is obviously more important to the community than the architects'.

Doorway to a purdah garden, 1935

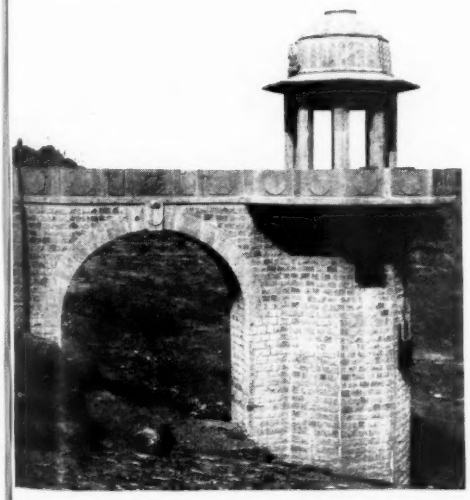


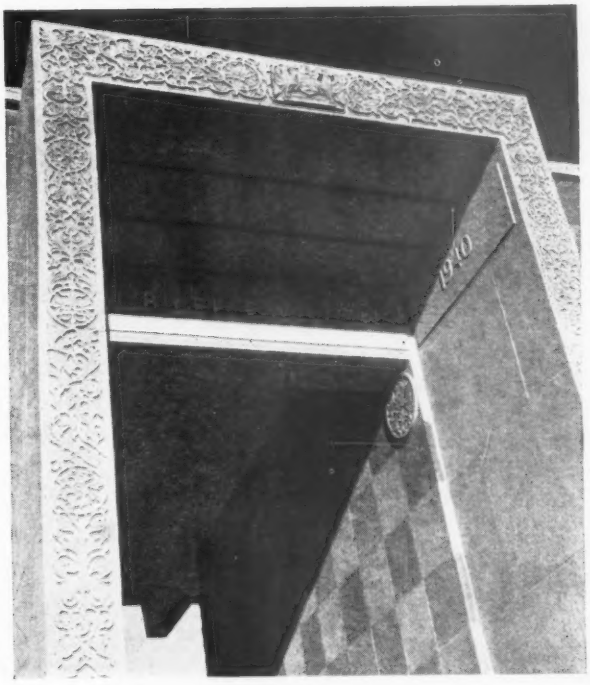
Guest house at Sardarsamand, 1936



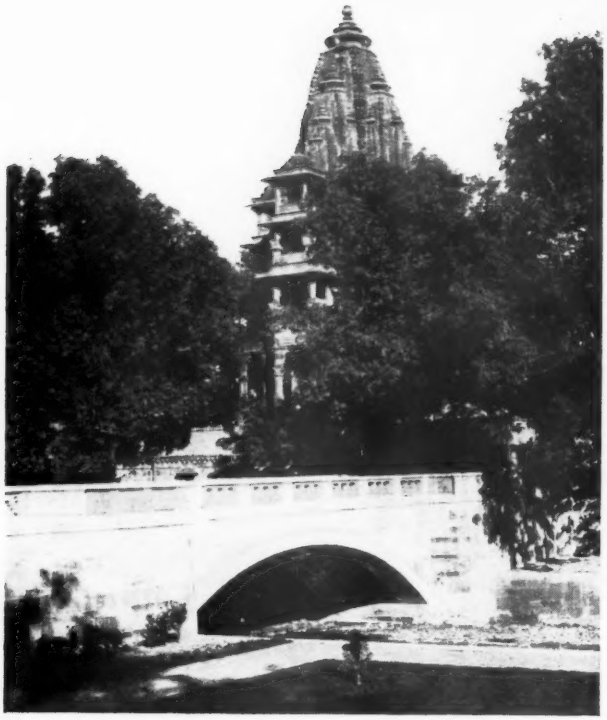
Tutorial block at Jaswant College, 1948

Above: Stadium pavilion, 1936. Below: The outlet tower at Umaid Sagar Reservoir, 1934

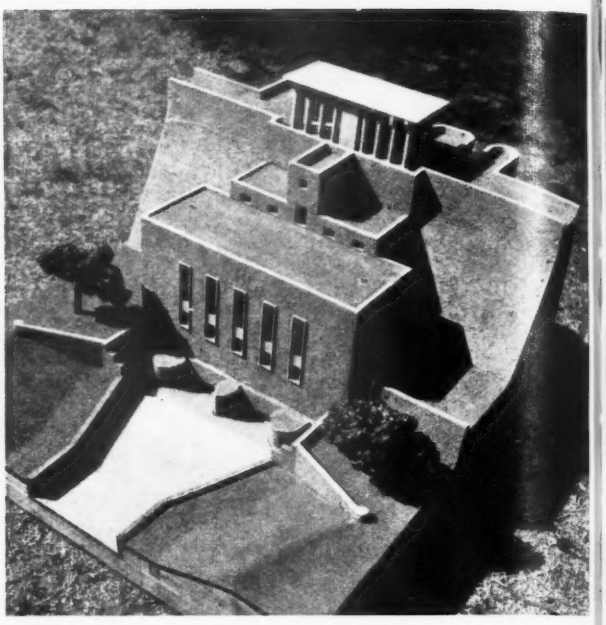




Doorway at the sports pavilion, Chopasni College, 1940. Carving of this type, and as in the top left photograph is of local design and workmanship



A bridge at Mandore, 1936



Model of the canal head generating station of the Jawai River project, 1946

In cases where an architect is employed, the execution of works normally devolves upon the State Engineer; from the architect's specification he prepares bills of quantities taken out under comparatively few headings to suit local practice. The items in the bill are then priced at current schedule rates and a total estimated cost is assessed. If, at this stage, the cost is found to be within budget provision, contractors are invited to tender. They are notified to inspect a copy of the estimate and drawings at the Engineer's office. Tenders are then submitted in very easy form, simply a statement of the percentage above or below the schedule rates at which they will undertake the work. It is usual for the lowest tender to be accepted, but for special works only first class contractors are invited.

Costs had risen in 1948 to two and a half times pre-war figures, but by comparison with areas such as Bombay and Calcutta they are still remarkably low. The Government Offices illustrated were built in 1935 for less than fivepence per cubic foot, but it must be remembered that rooms are very much higher than in Europe, 14 ft. is considered normal for offices and bungalows. Immediately after the war there would have been a building boom had petrol for lorries not been very short and strictly controlled.

Economy in costs depends entirely upon using local materials and a structural system familiar to local builders. Previous works by these contractors may lead one to believe that they will handle equally well a different type of construction, but it has been found that an appreciable change has meant bringing in a contractor from one of the cities such as Bombay or Calcutta, with a consequent considerable increase in costs.

Before attempting a design, an architect called in to advise on a building project in this newly constituted province is well advised to spend several days studying both the recent building work of the Public Works Department and buildings both new and old in the suburbs and within the city in order to find out how the pecularities of local climate are met, and how structural problems which recur frequently are solved by local builders in terms of local materials. The State Engineers can often give valuable help.

Building requirements are usually simple and are easily met once the local way of living and weather conditions throughout the year are understood.

Mechanical air-conditioning at present entails excessively heavy running costs, but it may be found that reasonably comfortable hot weather conditions can be obtained by adopting simple local devices for cooling. The siting of buildings across the direction of the prevailing hot-weather wind, and plan arrangements of rooms to allow a free through passage of air are extremely important. Compact and convenient planning may be worth sacrificing to some extent for this reason. Every important new building should, however, be provided with an air duct system and machine space for the future installation of air-conditioning plant.

It may be said that these notes on building in Rajputana refer to a technique of building long since out-dated in progressive countries and no longer of interest except perhaps historically; but there is still a vast amount of building to be done in the more remote parts of the earth where the only practicable technique will be the one understood by the local men.

Finally, the suggestion is offered to any student of the Indian Society who has not already selected a thesis subject that the work of Sir Swinton Jacob will prove extremely interesting.

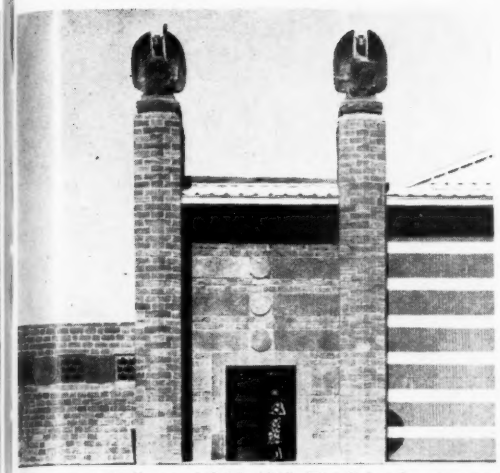
EDITOR'S NOTE

The buildings here illustrated were constructed by Jodhpur contractors under the supervision of the Public Works Department of the Government of Jodhpur—chief engineers the late S. G. Edgar, C.B.E., I.S.E., and F. F. Fergusson, F.G.S., M.I.C.E., between 1930 *and* 1948.

They were designed by G. A. Goldstraw, B.A. [A], Architect to the Government of Jodhpur. Mr. Walter George, A.R.C.A. [F], collaborated on the design of the Government office building.

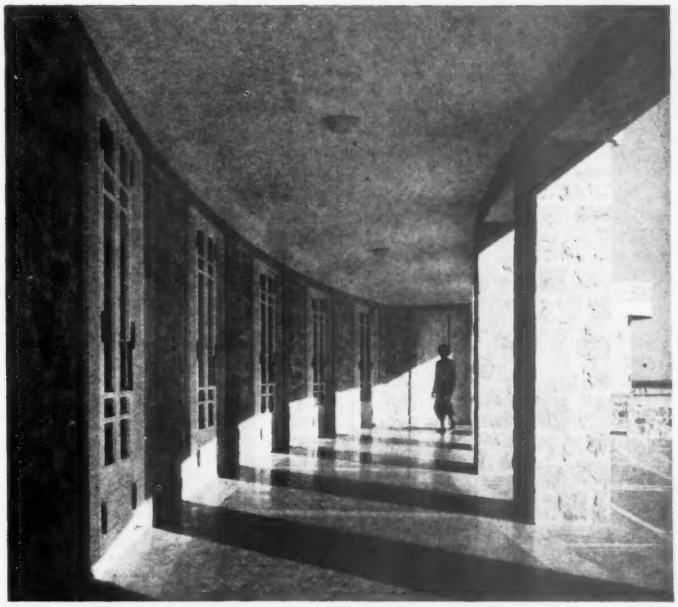
Various local stones were used—red sandstone, buff sandstone, grey granite and rhyolite. Arabesque enrichment was designed and carved by local masons.

The generating station, etc., for the Jawai River irrigation and hydro-electric project, shown as a model, was under construction in 1948. *Random granite is to be used for both the dams and generating stations. Mr. Goldstraw acted as consulting architect to the engineer, Mr. Fergusson, who was responsible for the scheme.*

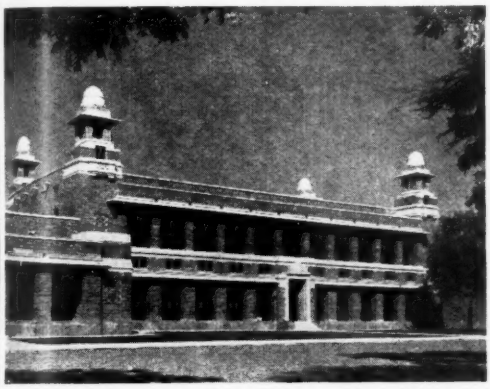


Doorway at Jodhpur airfield, 1932. The flying horses were carved from a small model by L. F. Roslyn (London)

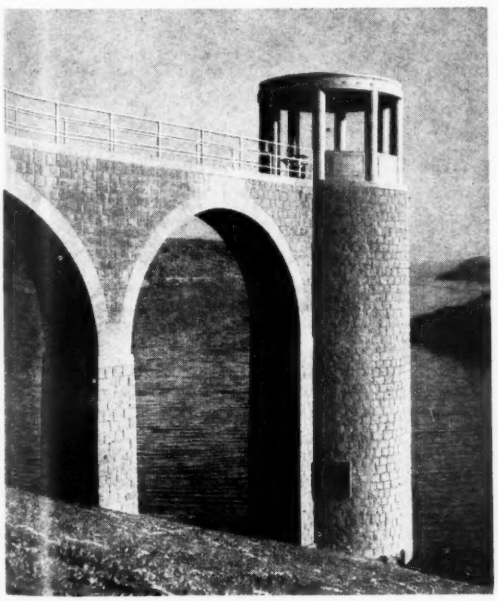
An inspection bungalow, the Jawai River project, 1946



Above: the verandah of a guest house at Sardarsamand, 1936. Below: a shooting box at Sardarsamand, 1932



Above: Government offices, 1935. Below: the outlet tower, the Takht Sagar reservoir, 1938



Thermal Insulation in Building

By A. G. Sutton,
M.A., M.Inst.F.

Part II

Fig. 15: Ministry of Works 'Standard' Factory at Blackwood

Fig. 16: Interior of factory at Blackwood showing fibreboard roof lining

11. The Insulation of Factory Buildings

Up to now we have been considering insulation mainly as applied to dwelling houses. It is not possible to say, in general terms, how much fuel will be saved by the insulation of a house since conditions, particularly the period of use of appliances, vary from one house to another. The Building Research Station experiments, however, have given a good indication of the results which can be obtained. In factories conditions are much more precise; normally the whole building is heated, if not continuously, at least for a given number of hours each day, and it is, therefore, possible in many cases to give a fairly close estimate of the effect of insulation in terms of fuel consumption.

Insulation of a factory building may save as much as half the fuel required to heat it. Moreover, a new factory can be insulated without adding to its initial capital cost. An insulated factory may even cost less than an uninsulated one. This is because the cost of the heating plant is reduced—often by more than the cost of providing insulation.*

Typical of modern factory construction is the group of buildings shown in Fig. 15. On the extreme left is a two-storey office block, and in the middle foreground a single-storey block. Both are brick built with flat roofs. The boiler house is a separate building on the right. The main factory, at the back, has a north-light roof. The southern slopes of the roof and the end walls above tie bar level are of corrugated asbestos cement sheeting; the lower part of the walls are brick. This type of construction is very common, and has certain advantages; it is easy and cheap to build and can be erected very quickly, factors which were of particular importance during the war. But heating presents a problem. The roof area in relation to the working space is about as large as it could be, and heat losses therefore tend to be high. A multi-storey building approaching the cube as nearly as possible in shape, is easier and more economical to heat.

The southern slopes of the roof of this particular factory, part of the interior of which is shown in Fig. 16, are lined with fibreboard. The fibreboard itself is an insulator, and it also provides an air space below the asbestos cement sheeting which affords additional thermal resistance.

* 'Insulation may save more than half the fuel required to heat an uninsulated building, and in the case of any new buildings which require to be provided with central heating or unit heaters, the cost of a heating installation may be reduced by more than the cost of providing insulation.' *Fuel Efficiency Bulletin No.* 12 (Ref. 1).

12. Heat Losses Through Sheeted Roofs

Both during and since the war, factories of this type have been put up without a lining to the roof. Now a single sheet of asbestos cement may serve to keep out the rain, but it allows heat to escape very rapidly, and is, therefore, very wasteful of fuel.

The thermal transmittance, or U value, of a corrugated asbestos cement roof with single sheeting is 1.40 (that is the number of British Thermal Units which will pass through each square foot of the structure per hour for each degree F. difference in temperature of the air on either side). The amount of fuel required to make good the heat loss through 1,000 square feet of this roof, under normal conditions, has been shown to be 7.8 tons of fuel per annum. If the roof is lined with half-inch thick insulating board, with an air space between the

TABLE VII.—HEAT LOSSES THROUGH SHEETED ROOFS

Roof construction	U B.Th.U./ft.²hr.°F.	Fuel used to make good heat loss through 1,000 sq. ft. of structure tons p.a.	Fuel saving due to insulation	
			Tons p.a./1,000 sq.ft.	%
Corrugated iron ..	1.50	8.4		
Corrugated asbestos cement	1.40	7.8		
Corrugated iron, lined with ½ in. fibreboard with air space ..	0.32	1.8	6.6	79
Corrugated asbestos cement lined with ½ in. fibreboard with air space	0.32	1.8	6.0	77

Fig. 17: Insulation of a factory at Banbury (Northern Aluminium Company). First stage: laying aluminium foil on corrugated aluminium sheeting

Fig. 18: Second stage: the sheeting with foil resting on top, is fixed to the purlins with hook bolts

lining and the roof, the U value is reduced from 1.40 to 0.32. The fuel required to make good the heat loss is reduced to 1.8 tons per annum. This is a reduction of 77 per cent of the heat loss through the roof, and represents an annual saving of 6 tons of fuel for every 1,000 square feet of roof area. Such a large saving may well mean that the fuel consumption for heating this type of building may be halved by providing the roof with an insulating lining.

Clearly, then, on economic grounds there can be no case for omitting to insulate this type of building, particularly if it entails no increase in first cost. Nevertheless, insulation has often been left out; no wonder these buildings are difficult to heat adequately and costly in fuel consumption. Can anything be done to improve matters? Is insulation of an existing building worth while?

For this type of construction the answer is definitely yes. Obviously it is easier and cheaper to insulate a building properly while it is being put up, than to add a layer of insulation afterwards. Even so, the saving in fuel will generally pay for the cost of insulating the roof within four years. The actual cost will, of course, vary with the method of insulation, the size and shape of the building, its location, and the height of the roof above the ground. A rough figure for half-inch insulating board suspended below the purlins is 1*s.* 6*d.* a square foot, fixed complete, or £75 for 1,000 square feet. The actual fuel saving will also depend on individual circumstances such as the type of fuel and the overall efficiency of the heating system. On the basis of 6 tons per thousand square feet, the saving in four years would be 24 tons, which would have cost more than the insulation.

How these figures have been derived is explained in Fuel Efficiency Bulletin No. 12 (Ref. 1), issued by the Ministry of Fuel and Power. The calculations may appear somewhat theoretical, but there has been no juggling with figures to make insulation look more worth-while than it really is. Results like this are achieved in practice.

13. Before and After Insulation—An Actual Case

About two years ago the Northern Aluminium Company decided to insulate 99,000 sq. ft. of corrugated asbestos cement roof at their factory at Banbury. The method they chose was a novel one, and is illustrated in Fig. 17. It consists of a layer of corrugated aluminium foil insulation supported on corrugated aluminium sheeting eighteen thousandths of an inch thick. Note that the corrugations of the foil run horizontally and at right angles to the corrugations on the supporting sheeting. Fig. 18 shows how the sheets, with the foil uppermost, are fixed to the purlins by cranked hook bolts. Compression of the foil insulation at the top and bottom of each sheet helps to seal the air space between the lining and the roof. The estimated cost of doing the job was 14.63 shillings a square yard, and the Company hoped it would save 600 tons of small anthracite for an annual heating period of 4,344 hours. The work was started in 1947. A rough check in December of that year, when only about 70 per cent had been completed, showed that the fuel consumption for space heating for the two preceding months had been reduced by about 100 tons.

At the end of the heating season, the fuel consumption for the six winter months was compared with that for the previous winter, i.e. before and after insulation. The results were given by the Company in the following words:

'Owing to lack of temperature and weather records, and also to the fact that the insulation is only now nearing completion, we are unable to put any definite figure to the amount of fuel saved, but, as you will see from the data given below, this should be appreciable.

Anthracite used for space heating

October 1946-March 1947, (No roof insulation.)	1,254 tons.
October 1947-March 1948, (Insulation being installed.)	629 tons.
Reduction in consumption,	625 tons.

External average shade temperatures

October 1946-March 1947:		
	Max. 42.3 deg. F.	Min. 33.4 deg. F.
October 1947-March 1948:		
	Max. 48.2 deg. F.	Min. 37.0 deg. F.
Difference	5.9 deg. F.	3.6 deg. F.

Average internal temperature

October-March 1946-47:	54.6 deg. F.
„ „ 1947-48:	59.2 deg. F.
Difference	4.6 deg. F.

'From these figures it will be seen that the internal maintained temperature appears to have increased in step with the external shade temperature, so that it may be reasonably assumed that a large part of the 625 tons difference can be attributed to the provision of roof insulation. It must also be borne in mind that during the fuel crisis of the 1946-47 winter no fuel was used for space heating for fourteen of the coldest days of the winter. The extra fuel consumed would have been in the region of 150 tons.'

The total cost, at 14.63 shillings a square yard, amounts to £8,041. On the basis of saving 625 tons of fuel a year at £3 15*s*. a ton, the annual saving is £2,432, which will pay for the insulation in three years.

Two facts in the Company's statement—first that the insulation was only nearing completion, and second that the heating was off for a fortnight during 1946-47—suggest that the annual fuel saving may be even greater. But, however the figures may be interpreted, the results do show in a striking way how very important and indeed how very worth-while insulation is.

Aluminium foil insulation was perhaps an obvious choice in this case. Other methods of roof insulation, however, will produce similar results.

14. Methods of Roof Insulation

Three different methods of factory roof insulation are illustrated in Fig. 19 (Ref. 1). The sketch at the top, applicable to pitched roofs, shows a method of fixing a rigid type of lining above purlins; packing strips are used to form an air space between lining and roofing. An alternative method is to suspend the insulation below the purlins with a special framework. The second sketch shows the use of insulating boards or slabs as permanent shuttering to poured concrete. The third sketch illustrates insulation applied externally and suitably protected.

External Insulation. An example of external roof insulation is shown in Fig. 20, where corkboard is being applied to the outer surface of a reinforced concrete roof. The cork slabs are set in bitumen, and afterwards covered with roofing felt. With external insulation, as shown here, the effect of the heat capacity of the concrete decking must be considered. If the building is heated continuously it may be an advantage to warm the structure itself. With intermittent heating, however, heating-up periods are prolonged, and the heat used to warm up the structure will be lost when it cools down. On the other hand external insulation protects the concrete from the sun in summer, and temperature stresses are therefore reduced. Where an asphalt covering is used the asphalt itself needs protection from the sun and should be finished with light coloured tiles, or limewash, or with Derbyshire spar rolled in.

Internal Insulation. Insulation should always be fixed below the roof when heating

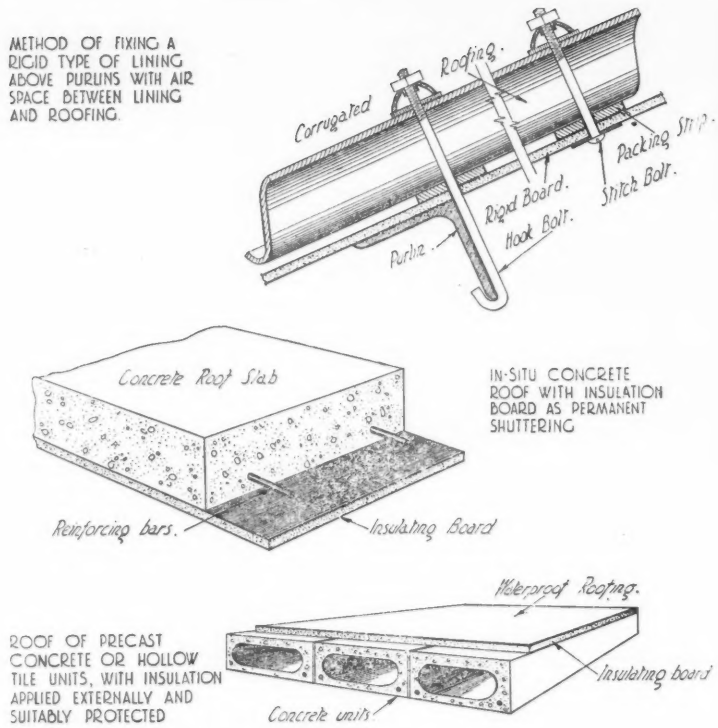

METHOD OF FIXING A RIGID TYPE OF LINING ABOVE PURLINS WITH AIR SPACE BETWEEN LINING AND ROOFING.
Corrugated
Roofing.
Packing Strip.
Stitch Bolt.
Rigid Board.
Hook Bolt.
Purlin.
Concrete Roof Slab
IN-SITU CONCRETE ROOF WITH INSULATION BOARD AS PERMANENT SHUTTERING
Reinforcing bars.
Insulating Board
Waterproof Roofing.
ROOF OF PRECAST CONCRETE OR HOLLOW TILE UNITS, WITH INSULATION APPLIED EXTERNALLY AND SUITABLY PROTECTED
Insulating board
Concrete units

Fig. 19: Methods of factory roof insulation

Fig. 20: External insulation of a concrete roof

is intermittent, to avoid the repeated loss of heat stored in the structure and to get warm internal surfaces.

The use of wood-wool slabs as permanent shuttering is shown in Fig. 21. This method of insulation gives economy in erection costs, but we lose the advantage of the air space obtained when the insulation is fixed on battens or suspended below the roof. Incidentally, if left unplastered wood-wool slabs will absorb sound to a remarkable extent, and they are therefore particularly useful as ceilings in offices where typing is carried out. Fibrous materials such as glass and slag wool and certain types of fibreboard also have the dual property of thermal insulation and sound absorption. Sound insulation treatment, however, usually demands expert advice.

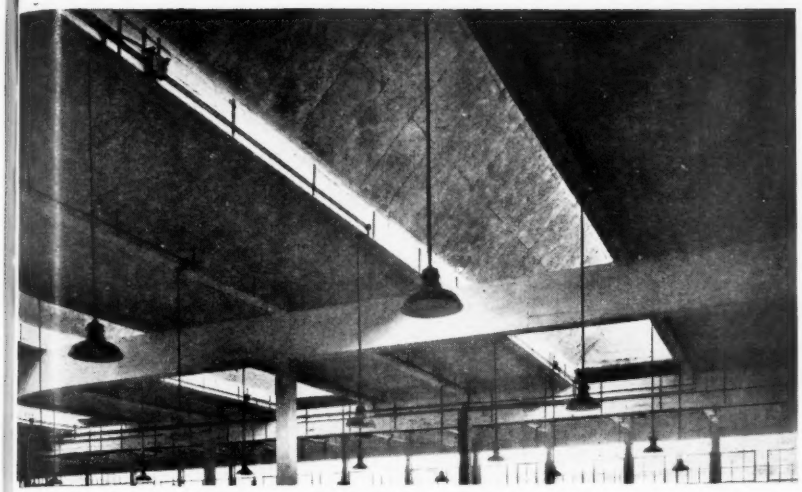


Fig. 21: Wood wool slabs as permanent shuttering for a concrete roof

Fig. 22: Over-purlin insulation, using wood wool slabs

Pitched Roofs. A typical example of the over-purlin method of roof insulation is shown in Fig. 22. Here wood-wool slabs are being laid over the roof framing and covered with a layer of waterproof felt. The corrugated roof sheeting is then placed on top and secured to the purlins by hook bolts which pass through the insulation. Obviously this method can only be used in new buildings, or when a roof has to be renewed, since the insulation is applied from above.

Insulating boards or slabs can also be applied below purlins; this is the method used in existing buildings. When fixed in this way they hide much of the steelwork, which collects dust, and they provide a surface which can be finished in a light colour, thus making the interior light and cheerful. The insulation is supported on inverted 'Tee' bars (Fig. 23) formed from steel strip, suspended from the purlins by clips. Most of the fibreboard manufacturers and firms who do this kind of work have their proprietary methods of fixing. Some firms use extruded aluminium Tee sections owing to shortage of steel. Although more expensive, aluminium has the advantage of saving weight, and incidentally has a better appearance than steel fixings.

When a roof has a large area of glass it is sometimes asked whether it is worth while insulating the unglazed area. It is true that glass is only a single sheet, with a thermal transmittance of about 1. On the other hand the rest of the roof, if only of single corrugated sheeting, has a higher transmittance—U = 1.40 or 1.50. Insulation reduces this to 0.32 (Table VII), so we get a reduction of about 77 per cent of the heat loss through the unglazed area, which may be from half to two-thirds of the whole roof. Fibreboard fixed below purlins can be seen between the glazed areas in Fig. 24.

15. Insulation of Factory Walls

Although the major heat losses occur through the roof a considerable amount of heat may also be lost through the walls of a factory. Thin sheeted walls particularly should be insulated. The thermal transmittance of a corrugated iron wall, for example, is 1.20, or four times that of an 11-in. cavity wall; the heat loss through 1,000 sq. ft. corresponds to a loss of 6.7 tons of fuel per annum. When lined with 1 in. thick wood-wool slabs plastered both sides, with air space, U becomes 0.27, and the heat loss is reduced to the equivalent of 1.5 tons per annum. This represents a saving of 5.2 tons per annum, or 78 per cent.

So long as they do not have to carry any load, wood-wool slabs can be used by themselves for building partitions or external walls if suitably rendered on the outside. Other insulating materials can equally well be used for lining walls—in fact the methods of wall construction shown in Fig. 4 (see Part I) also apply to the building of factories. These methods of construction should be seriously considered when building a new factory, since the cost of adding insulation at a later date may be difficult to justify.

16. Heat Losses through Large Doors

Since the thermal transmittance of a single sheet of corrugated iron (as a wall) is 1.20, the lining of large doors such as those shown in Fig. 16 is well worth considering.

When large doors are left open for any length of time, however, as they frequently are, the heat losses become more serious. Cases have been known where a whole factory has been lowered in temperature by 10 degrees or more through doors on opposite sides of the factory being left open (Ref. 2 (*c*)). Design can help to prevent this sort of thing happening. Heavy doors and roller shutters that are clumsy and difficult to operate by hand are the most liable to be left open; they should be avoided unless they are fitted with some kind of mechanical equipment. Where continuous access is required between two buildings they should be joined by a covered way.

A good way of dealing with despatch departments and loading bays is shown in Fig. 25. Here the despatch department is separated by a wall from the rest of the building. Neither the open door nor the absence of roof insulation matter, since the bay is unheated.

17. Summary of the Problem of Factory Insulation

The factors which affect the heat losses from factory buildings are similar to those we considered in Part I in connection with house construction.

1. First there is the shape of the building. Most of the heat losses occur through the roof, so that multi-storey construction, by economizing in roof area, is an advantage.

2. The ground floor. A solid concrete floor will almost invariably be used, except perhaps in special cases where a basement serves some particular purpose. With an unheated basement, insulation beneath the floor above may be of advantage. Wood

blocks on a concrete floor help to reduce heat losses.

3. The walls. As in the case of house construction, or for that matter any other type of heated building, the unventilated cavity wall with light-weight block inner leaf merits consideration. Thin sheeted walls used with framed buildings should have an insulating lining of boards, slabs or light-weight blocks.

4. Windows. Factories always have large areas of glazing, and there is not much that can be done at present to reduce the heat losses through the glass. Double glazing on a large scale is not yet practicable. The important thing that we can do is to stop cold air coming in by sealing cracks round the edges of the glass and by making sure that the frames of windows made to open are a good fit.

5. Doors. Avoid as far as possible having large doors opening into the main factory space. This can be done by dividing off the receiving and despatch departments from the rest of the factory. Doors should be easy to operate, and if they have to be large and heavy they should be mechanically controlled. Like windows they should fit properly.

6. Roofs. The important thing to remember is that it may be cheaper to build a new factory with an insulated roof than to leave out the insulation. The cost of insulating a sheeted roof may be completely offset by the reduced cost of the heating plant. The annual saving of fuel amounts to 6 tons per thousand square feet of roof insulated.

18. Conclusion

To sum up, the thermal insulation of buildings must be viewed in the right perspective. First, design is important, so that the building can be heated economically. Second, supervision will ensure that the insulation is properly installed. Third, a general tightening-up all round will avoid excessive heat losses by other means—e.g. where corrugated sheeting is used for walls or roof, adjacent sheets should fit snugly together, and any gaps at ridges, gutters and gable ends should be effectively sealed.

No one who is responsible for the design, construction or maintenance of any heated building can afford to ignore the importance and advantages of insulation. Nevertheless, it should be remembered that proper insulation and airtightness of structure together go to the making of a thermally good building.

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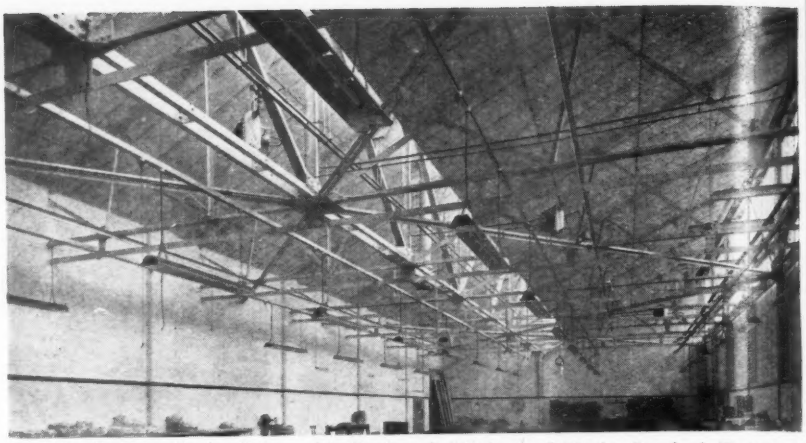

Fig. 23: Under-purlin insulation with fibreboard (Ministry of Works Standard Factory at Merthyr Tydfil)

Fig. 24: A roof lined with insulating board between glazed areas (Building Trades' Training Centre, Kidbrooke)

Fig. 25: Heat losses through large doors being left open can be avoided by separating the receiving and despatch departments from the main factory. The area shown here is unheated. (Ministry of Works Standard Factory at Ammanford)

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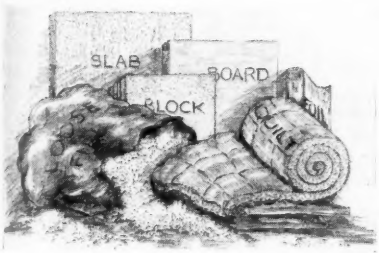


Review of Construction and Materials

This section gives technical and general information. The following bodies deal with specialized branches of research and will willingly answer inquiries.
The Director, The Building Research Station, Garston, near Watford, Herts. Telephone: Garston 2246.
The Director, The Forest Products Research Laboratory, Princes Risborough, Bucks. Telephone: Princes Risborough 101.
The Director, The British Standards Institution, 28 Victoria Street, Westminster, S.W.1. Telephone: Abbey 3333.
The Director, The Building Centre, 9 Conduit Street, W.1. Telephone: Mayfair 8641-46.

N.B.S. Special Report No. 6. This deals with pattern staining in buildings, and was written by N. S. Billington, M.Sc., and D. G. R. Bonnell, M.Sc., Ph.D., of the Building Research Station. Investigations were made on two types of ceilings; lath and plaster, and hollow tile; but the results provide an explanation of the phenomenon in all types of non-homogeneous construction.

The report says that pattern staining on ceilings or walls used to be put down to some filtering action of the plaster, which retained dust particles from the air passing through the structure, but it is now known that staining is due to thermal precipitation of dust on the surface; this precipitation occurs whenever dust-laden air comes in contact with a surface which is cooler than the adjacent air, and the rate of deposition increases as the temperature difference between the surface and the air increases. Conversely, a surface which is warmer than the air repels dust and remains clear. If the temperature of a cool surface is not uniform, more dust is deposited on the cooler portions than on the warmer ones, and differential staining occurs.

In a lath and plaster ceiling heat flows more rapidly through the plaster and keys between the laths, as the wood of the laths is a poorer conductor of heat than plaster is, thus the portions of the ceiling plaster immediately below the keys are slightly colder than those beneath the laths; therefore, dust is more readily deposited under the keys, and dark bands appear on the ceiling. In hollow-tile floors the heat-flow is greater through the concrete beams than through the tiles, therefore the plaster in contact with the undersides of the beams is cooler than the remainder, and dust is deposited on those areas.

The report states that if pattern staining is to be avoided, sufficient thermal insulation must be provided to make the heat-flow uniform through the different parts of the ceiling, thus preventing thermal differentiation between various areas of the ceiling and the air beneath. Alternatively, staining will be prevented if the surface temperature of the ceiling is greater than that of the adjacent air below, as it might be with certain forms of heating.

Tests were made of certain remedial measures, but they were confined to those illustrating particular principles; however, the investigations served to indicate the broad principles to be followed. One method is to use a greater thickness of cover over a non-homogeneous structure, particularly when the cover is of some conducting material, such as metal, concrete, or plaster. This extra cover will affect the total heat-flow only a little, but it will reduce the temperature differences.

The second method is to apply insulation to the back (the cold side) of the structure; this will reduce the total heat-flow and thus lessen the general blackening. It is also worth while to apply some insulation locally behind the colder portions of the surface, to even out the heat-flow through the wall or ceiling; if this is accurately computed the appearance of the pattern is prevented. In normal circumstances 1 in. of glass silk or slag wool placed between the joists over a lath and plaster ceiling may be sufficient, or, of course, equivalent thicknesses of other insulating materials may be used. In hollow-tile floors there should be placed under the concrete ribs the insulation equivalent of $\frac{1}{2}$ in. of wood, $\frac{1}{4}$ in. of insulating board, or 3 or 4 in. of concrete.

It is noted that pattern staining is more prevalent with convection-type than with radiant-type heating.

The Special Report includes photographs, diagrams, and tables. It is priced at 6*d.* net, or 7*d.* to cover postage, and may be obtained from H.M.S.O.

National Building Studies. Bulletin No. 6, gypsum and anhydrite plasters, deals with the properties of these plasters both during application and as set material. The contents include an introduction; manufacture, materials based on plaster of Paris, and on anhydrite calcium sulphate; general properties; properties of set material; uses; admixture with other materials; mixes normally used; precautions during use; appendix A, classification of proprietary and other gypsum and anhydrite building plasters; appendix B, interrelation of gypsum and anhydrite plaster types. The Bulletin can be obtained from H.M.S.O., price 6*d.* net.

Building Research, 1947. The Department of Scientific and Industrial Research have published their report of the Building Research Board, with the report of the Director of Building Research, for the year 1947. The Board's report mentions the decision to open a branch of the Building Research Station in Scotland; it also announces the appointment of 47 Honorary Observers in different parts of the country, following a suggestion put forward by the

R.I.B.A. Architectural Science Board. These observers collect information on local experience and practice and send it to the Station, where it is collected with similar information with a view to publication.

The report of the Director deals with general research and co-operative investigations; the inter-departmental committee on house construction and the post-war study committees; inquiries and special investigations; and British Standards and Codes of Practice. Among the many subjects of investigation were new types of oil paint and distemper designed to effect economy in the use of linseed oil; flooring materials; and building boards using a substantial proportion of straw in their composition.

Work was also carried out on foundations for small houses, including observations of the vertical movement of datum points placed at different depths in a fat clay soil under grass, and it was noted that the movements were directly related to the changes in water content.

The principal work of the year was the preparation of a report on the blocklaying experiment carried out at Abbots Langley, the units being those needing one hand to handle, both hands, and, thirdly, two men. Time recordings were made of the various labours, nearly a quarter of a million readings being taken.

Investigations were carried out on condensation, but, unfortunately, the report does not give any formula for convincing a client that the appearance of moisture on the inside of a building is not necessarily a sign of penetration through the structure and, by the same token, of the lack of professional knowledge on the part of the architect.

Previous study on problems of lighting was carried to the stage of practical application to town planning, for the guidance of planning officers and consultants regarding the manual on 'The Redevelopment of Central Areas', prepared by the Ministry of Town and Country Planning.

A request from the Ministry of Works for recommendation for the reconstruction of part of the National Gallery formed the most substantial single item of the year's work on lighting, and it was considered that the most promising course would be to arrange a louvre system in the roof and a laylight to light the pictures and at the same time to cut off or reduce views of the sky from the central parts of the rooms. The illustrations show a typical cross-section through the gallery, and also a model of the arrangement of the louvres and laylight.

During the year 3,656 inquiries were received, being 804 more than in 1946; 1,095 were from architects and professional consultants, 615 from manufacturers, 710 from builders and contractors, 347 from Government departments, 361 from local authorities, 198 from professional or industrial institutions, 11 from the technical press, and 319 from private individuals.

The report is published by His Majesty's Stationery Office, price 2*s*. net.

Building Apprentices. At a recent meeting of the Building Apprenticeship and Training Council the Minister of Works, Mr. Charles W. Key, presented scholarship awards to building apprentices. In the course of his speech the Minister reminded his audience that the main object of the Training Council, set up some six years ago, is to see that an adequate number of boys are trained for the building industry, and to give attention to such matters as a review of the existing apprenticeship scheme; a definition of minimum standards to be observed; a register of apprentices; the issue of certificates; and the consideration of the best means whereby employers and apprentices can be encouraged to take part in approved schemes.

National registration was set up some three years ago, and 41,500 boys have entered into apprenticeship arrangements by indenture, but the annual intake aimed at is 22,000 to maintain an adequate craftsmanship strength of 550,000, for the period of apprenticeship is five years. A census is now being taken by the Ministry of Works to find out what the intake of apprentices is, but it is expected that the figures will not nearly reach 22,000.

Certificates of training completion have been issued to over 5,000 boys who have become craftsmen, but there is a wide gap between the number of boys completing apprenticeship and of those obtaining certificates as evidence of craft ability; further encouragement in this direction is therefore needed.

The B.A.T. Council have always recognized the need for the development of senior full-time courses at technical colleges for boys who have had a good general education up to the age of 16 or over; there are now eleven courses for national diplomas in building technology in England and three in Scotland.

The Minister spoke of the Apprentice Master Scheme, which provides for an approved contractor employing apprentices under skilled supervision and training on craftsman's work, the Government bearing the extra cost above that for normal methods of building.

The B.A.T. Council aim at raising the number of masons in the country to 13,750 craftsmen, with a recruitment of 550 apprentices a year. The Ministry of Works and other Government departments have given consideration to ways and means of encouraging the use of stonework in buildings; new and repair work in stone being freely licensed where large quantities of timber and steel are not required, and the Minister acknowledged the valuable publicity given by the R.I.B.A. in the JOURNAL.

Ventilation Nomograms. During the course of their existence in the field of natural ventilation Messrs. Colt Ventilation Ltd., have gathered together much technical information and experience. From the data thus obtained they have issued nomograms, being condensed and simplified tabulations set out on logarithmic charts, which can be read easily by engineers and other interested persons without having to use slide-rules or scales.

Leaflet No. 43 gives the recommended number of air changes per hour for specified industries; leaflets Nos. 44a and 45a are nomograms for calculating the number of Colt ventilators, P.R. and S.R. respectively, that are required to give the air changes. Column 1, on the left of the leaflet, has a vertical line on which graduations represent the height of extract above inlet multiplied by temperature difference (inside and out). Column 2, towards the right, is graduated with the number of ventilators required; and column 3, full right, has graduations for the net cube of building in units of 1,000 cubic feet. By placing a straight-edge on the appropriate graduation markings on columns 1 and 3, the number of ventilators required can be read directly from column 2.

Messrs. Colt are preparing a complete series of nomograms, and inquiries should be addressed to the firm at Surbiton, Surrey.

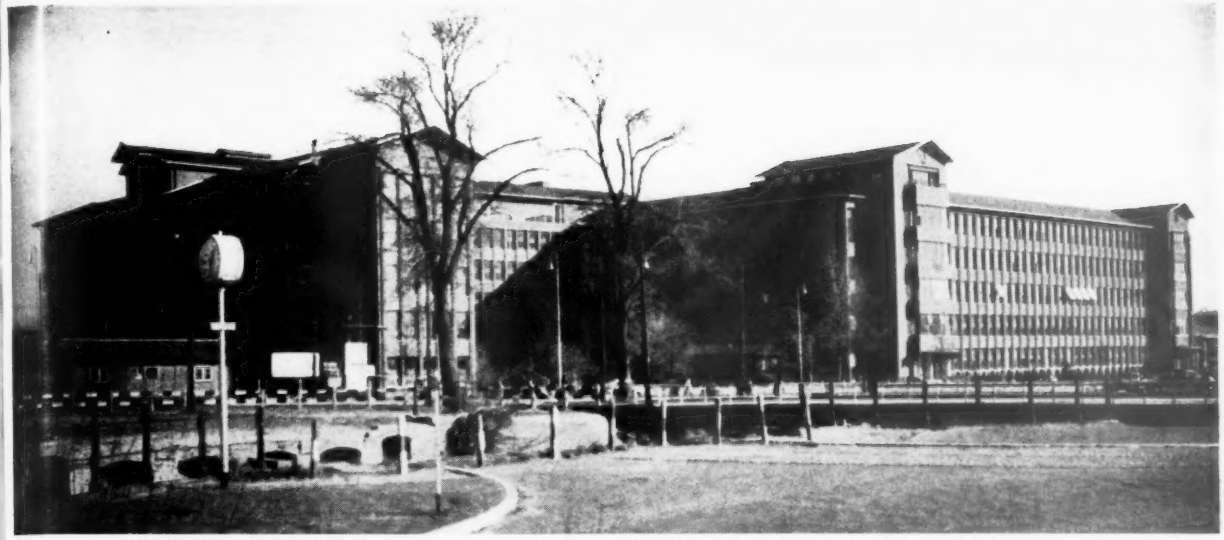
Codes of Practice. British Standard Code of Practice CP211 (1949) General Series, has now been published under the title Internal Plastering. Contents: Section 1, General; Section 2, Materials, appliances and components; Section 3, Design considerations; Section 4, Work off site; Section 5, Work on site; Section 6, Inspection; Section 7, Maintenance; Section 8, Appendices. There are also tables.

Sub-code 211.101 (included in the same cover) is divided into similar sections and deals with backgrounds for internal plastering; sub-code 211.201 is on internal lime plastering; sub-code 211.202 deals with internal gypsum and anhydrite plastering, and sub-code 211.203 is on internal cement plastering. The Code can be obtained from the British Standards Institution, 24-28 Victoria Street, London, S.W.1, price 10*s*. post free.

A slip inserted in the Code states that 'During the present abnormal conditions it may not be practicable to take full advantage of all the recommendations made in this Code of Practice.'

Zinc Spraying. In the April 1949 JOURNAL, an Architectural Science Board lecture on the protection of metals against corrosion was reported. It was given by Dr. T. P. Hoar, of Cambridge University. Dr. Hoar is corrosion consultant to the Schori Metallising Process Company, who specialize in zinc spraying for rust-proofing and carried out work on the Menai Bridge at the beginning of the last war. The Company have recently been commissioned to recondition the steelwork of the Tower Building on the waterfront of Liverpool.

A number of architects and engineers have already inspected the work in progress and the Company now propose to give a morning and afternoon demonstration at the site in Liverpool on Thursday, 27 October next, to which they invite architects. Those who contemplate going to see the demonstration should communicate with the Company at Brent Crescent, North Circular Road, London, N.W.10.



General view of the building from the south-west. The newest wing is on the right

The K.L.M. Building, The Hague

Architects: The Architects' Office Roosenburg; the Hague

THE FIRST PART of this headquarters building for one of the world's largest airlines was completed in 1940. The President-Director, Dr. A. Plesman, however, continued to develop the scheme during his banishment in the war years, and the architects were instructed in October 1945 to complete the building. Work on the site began in March 1946, and the building was opened in May 1949.

So great an expansion of K.L.M. activities occurred in the post-war years that the architects had to make numerous additions and alterations as the work proceeded. Some drawings were altered as many as twenty times, and the architects produced altogether about 1,000 drawings, and the technical advisers and sub-contractors a further 700.

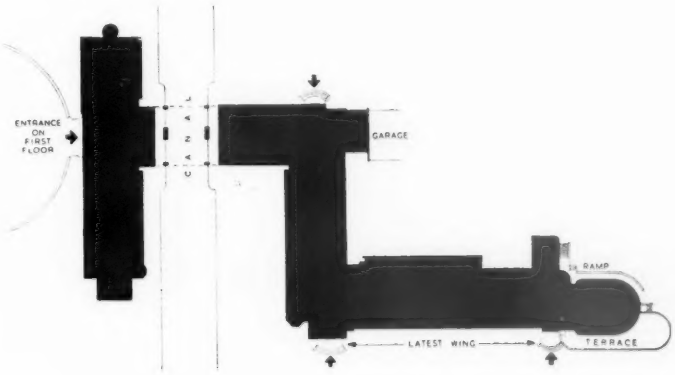
The building consists mainly of office space, which is sub-divided by removable steel unit partitions. These are rigidly standardized to a 90 cm. unit. The windows are 180 cm. wide. Thus rooms can be created about 6 ft., 12 ft. or 18 ft. wide as required. A partition of seven units, 21 ft. long, can be taken down and replaced in two hours.

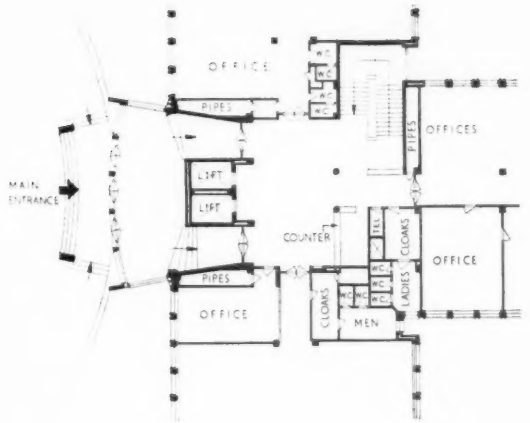
On the fourth floor in the centre of the building is a suite of rooms for the President and his staff, together with a board room. In addition there is very full provision of special rooms for the health and comfort of a large staff. At the junctions of every two wings are halls with lifts and staircases and staff toilets. On the first floor in the hall above the staff entrance is a shop for tobacco, flowers, chocolates, etc., and on the ground floor a hairdresser's shop. There are two canteens, one on the ground floor with a terrace and accommodation in the garden, for those who bring sandwich lunches and want coffee or tea; the second is on the fifth floor and provides an inexpensive full lunch; it has a terrace providing fine views. Also on this floor are a library and club-room for the staff, where ping-pong and other games can be played. A gymnasium is situated in a mezzanine; this is used principally by the girls operating mechanical equipment who go there every day in groups of 20 or 30.

The basement contains filing stores, stencil rooms, printing and photographic studio. On the ground floor is a fully-equipped medical department, where all employees are regularly examined; there is X-ray apparatus for T.B. control. There are two garages for 1,300 cycles, and a garage for fourteen official cars; there is also ample car-parking space in front of each entrance.

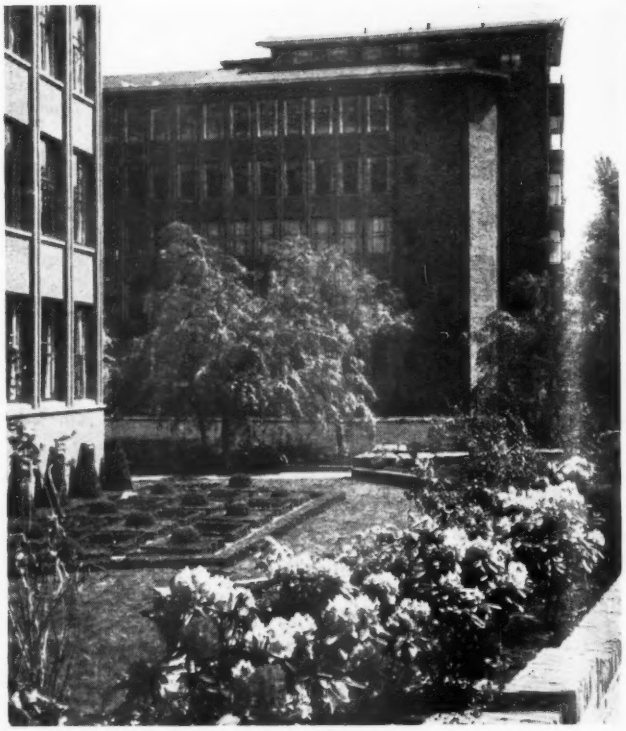
On a lower level in the basement are the technical services, including the central heating, ventilation plant, electrical equipment, emergency lighting, transformer and automatic telephone installation for 1,500 instruments. There are about 100 electric motors in the building. The chief engineer has an apartment on the ground floor, and there are two other apartments in the building, for the garage manager and the restaurant manager respectively.

The building is approached from two different road levels, with the result that the main entrance is at first floor level. A canal leading to a nursery garden intersects the site. This is bridged by the building, the first floor forming the lowest level of the bridge.

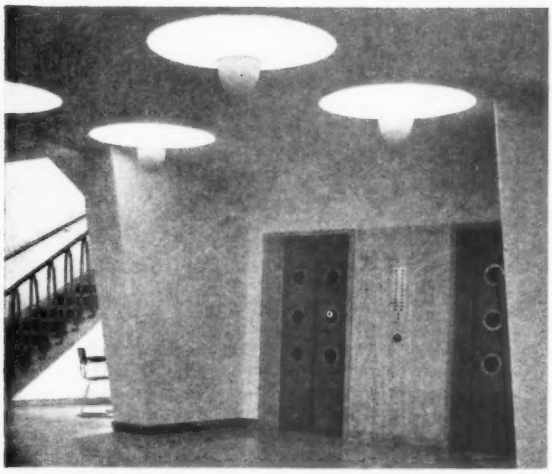




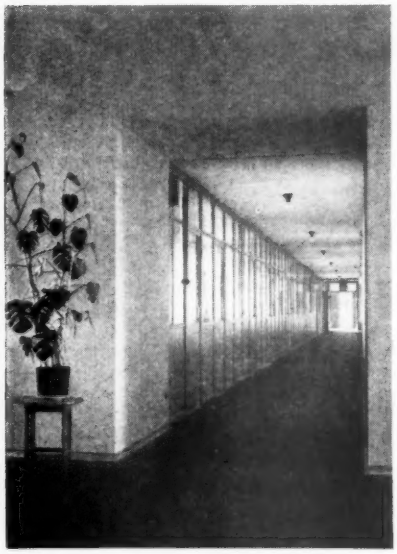
Part plan showing the main entrance hall



A typical view in the gardens surrounding the building

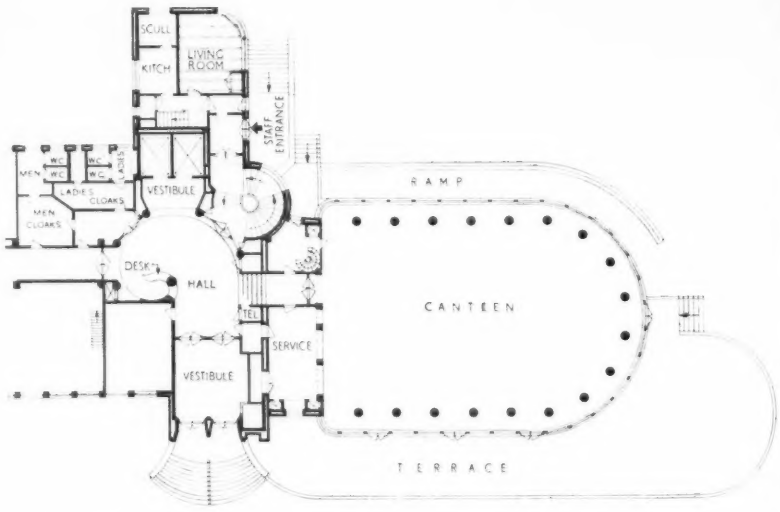


Above: The fourth floor main landing. Below: a typical corridor showing movable partitions



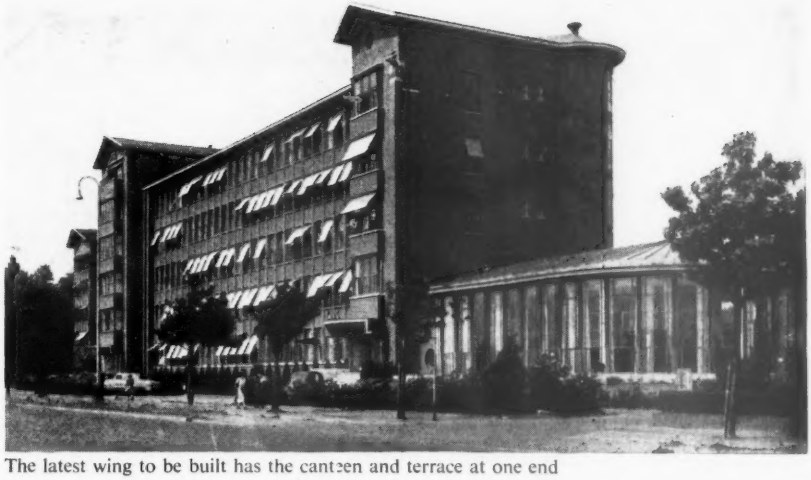
The foundation is a 3 ft. thick r.c. raft, and the basement is a tank of r.c. This carries a steel frame, encased in concrete or brickwork. Floors are of r.c. units. The older roofs are covered with copper, the new with asphalt to which copper is to be added later on.

The members of the Architects' Office Roosenburg, are Ir. D. Roosenburg, B.N.A., P. Verhave, B.N.A., and Ir. J. G. E. Luyt, B.N.A. The consultants for the heating, air conditioning, etc., were M. D. Galjema, for the electrical equipment, Nagtglas Versteeg, and for the gardens Mrs. S. H. Rosse-Luyt of the U.S.A.



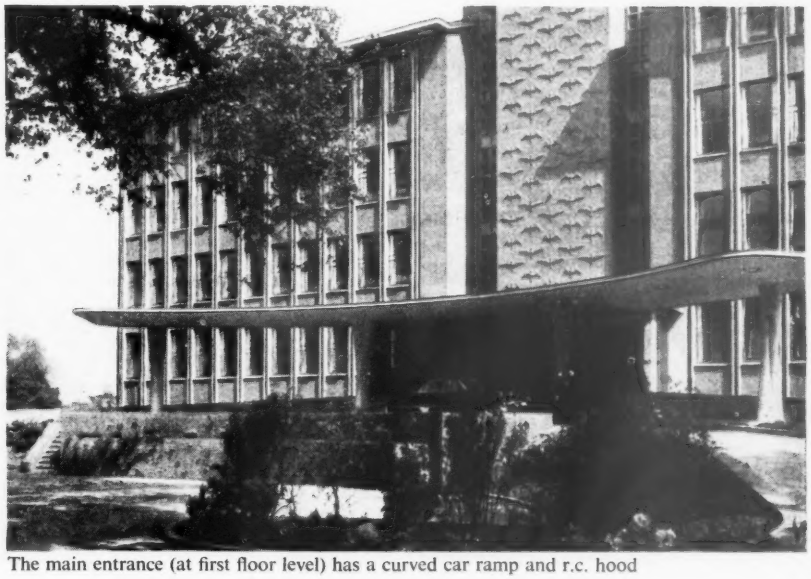
Part plan showing secondary entrance and canteen

A canal passes under the building

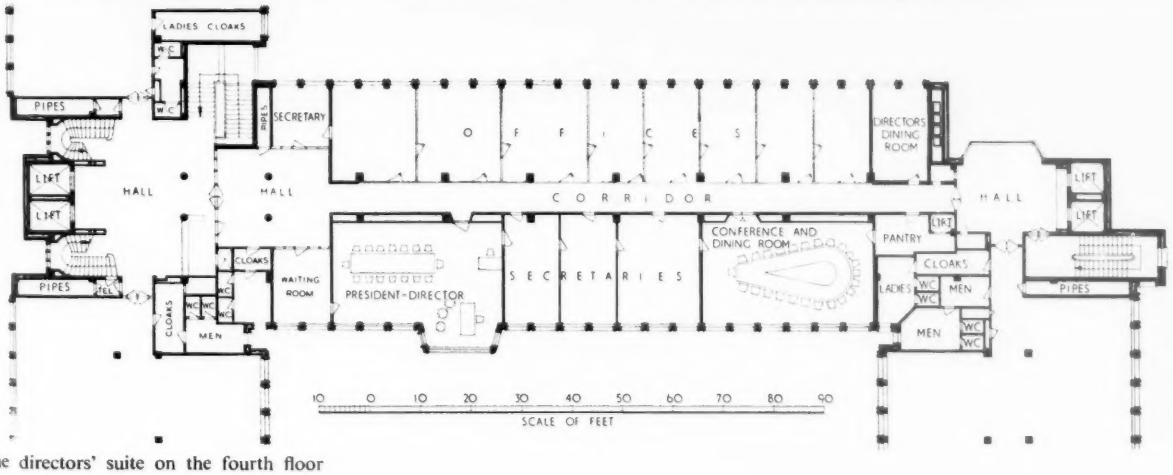


The latest wing to be built has the canteen and terrace at one end

The hood at the main entrance



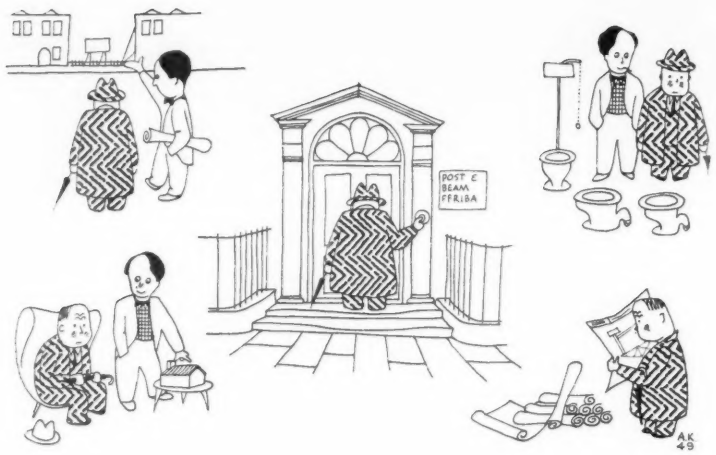
The main entrance (at first floor level) has a curved car ramp and r.c. hood



The directors' suite on the fourth floor

The Client, Poor Soul

By Thomas H. Creighton
Editor *Progressive Architecture**



SEVERAL YEARS AGO PROGRESSIVE ARCHITECTURE published a house designed by Frank Lloyd Wright for the Affleck family. We wrote the Afflecks, asking their opinion of the building after they had lived in it for some years. Mrs. Affleck replied in great detail, recounting their experiences with Wright, with sightseers, and with neighbours, ending with the remark (which we quoted) that, 'I know the roof has leaked and that the skylights leak, but I would rather live in this house than in any other house in the world.'

A few months after the house was published, I met Wright at the Princeton Conference; he looked at me accusingly and said, 'You're the editor who published the Affleck house, and said the roof leaked.'

'We didn't say the roof leaked, Mr. Wright,' I replied. 'Your client said that.'

Wright waved his hand in the air and, as he walked away, said, 'Oh, the client—poor soul, poor soul!'

Not every architect can be so off-hand about his client's welfare, and few of them would consciously want to. Yet the client, poor soul, is in many cases the forgotten man in the designing and building operation. I know that this is heresy, in addressing a professional audience, but I would like to make the point that the architect and the engineer, in protecting their own interests (which until recently had been highly pregnable), have often overlooked the *basic* interests of the client. I use the word *basic* because I realize that the client's legal interests—protection against the building falling down, etc.—are usually well taken care of.

I feel that I'm justified in making this twist on the usual gripe of the professional (that the client doesn't understand him) because I honestly believe that many of the architect's troubles would be cleared up if he sympathized a bit more with the client. So, for a few hundred words, let's forget our usual biases and perfectly legitimate points of view, and put ourselves in the client's place.

In the first place, the average client is completely new to the game. The repeaters —mostly speculative entrepreneurs or public agencies—are rare. The family which is going to build a house; the storekeeper who is going to remodel his property; the hospital board which is interested in a new building; these are ordinary people who have never before dealt with an architect professionally, never signed a building contract, never had to approve an extra. The things that can go wrong, if the client isn't very bright and nothing works out well, have been pretty fully documented by the Mr. Blandings type of story. But even in the smooth, ordinary course of events the very inexperience of the client makes this position difficult.

For example, his first contact with the architect—his first interview—will be very baffling. Always before when he wanted to buy something, he could find out what the price would be, what the quality would be, and what the object would look like. Now, however, he is told (and very rightly, mind you) that no one can give him an estimate of cost even approximating accuracy until he has obligated himself to considerable expense; that no one can describe to him what his building will look like or be built of until the problem has been studied for some time—again with expense to him involved—and that the business arrangements are like nothing he has ever before encountered.

His architect may treat him in one of two ways in those first interviews, neither of which will seem to make much sense. Either he will be told nothing of fees and contract arrangements (some architects are afraid that that will 'scare off' clients if the subject is brought up too soon, and some never do get nearer to a contract than a 'letter of intent,' which is completely worthless); or he will be faced bluntly with a contract for professional services before he has more than the foggiest idea of what those services will involve in a general way or in relation to his particular dream building.

Let's assume that the architect has been clever and/or diplomatic, and has explained all that is involved (perhaps by the use of one of the available pamphlets on the subject) and that compensation, procedure, and possible pitfalls are carefully defined. The client still doesn't know what his building is going to cost. There are many variables. One, of course, is the architect's ability and good judgment. Another is the fluctuation of the building market. A third, in the case of some structures, is the willingness of the banking fraternity to lend money.

Let us put these difficulties in simple illustrations. There have been instances of architects designing houses which couldn't possibly, even under the most favourable circumstances, be built within the client's budget. There have been hospitals for which preliminary drawings were prepared, preliminary estimates received, and fund raising campaigns successfully concluded, only for the client to find that in the meantime prices had gone up, and that more money must be milked from a reluctant community or the project dropped. That's pretty tough on an unsuspecting client, but it's nobody's fault. And there have been examples of mortgage commitments (which can not be made, obviously, until *after* drawings have been prepared) being less available than either client or architect had anticipated. So the client has to put up more funds of his own or give up the idea to build—again *after* he has committed himself to the expense of the drawings.

And then, suppose the client just plain doesn't like the building that the architect has designed for him? A good friend of mine recently had that happen. His architects were good; he was a reasonable client. But for one reason or another they couldn't get together on a house that satisfied both of them. I think that the architects themselves would admit (perhaps only to themselves) that this job wasn't one of their best efforts. No architect is ever completely happy with every job he does, and this was one which they couldn't seem to click on. So finally the client paid them off, and that was a fairly expensive that. The point is—and I don't believe it's an entirely invalid one—that a client has promised to pay for something that he hasn't seen and won't see for some time.

You can meet this argument in several ways. For instance, the client should choose his designer on the basis of past performances, and he *probably* won't go wrong. Or, you can say that he is buying professional services, not a tangible object. But those are *our* arguments, on the professional side of the fence. From the client's side, he often sees only that he is buying an intangible

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liability and taking a chance that it will function well, and that what he is interested in ultimately is not the architect's services as such, but the very tangible *building* that will result from activity by the architect and others.

I think just one more point might be made for the client, poor soul, and that is that he sits in an uncomfortable position in today's stream of technical advance. Many side-line rooters, including architectural editors, have urged architects to experiment, to be bold in the use of new materials and new techniques. At whose expense? The client's, of course. If the architect *doesn't* urge his client to use a new heating system, for instance, he is doing him a disservice, and not acquainting him with possible comfort benefits, or even possible savings in original cost or upkeep. On the other hand, if he recommends its adoption, he certainly isn't going to guarantee its performance and, beyond purely technical warranties, neither is the contractor. There must be research in building methods and the use of available products, but it can't all be in the laboratory. Before long, some client is going to be persuaded to be a guinea pig on all these developments. He's doing a public service, and making better buildings possible for future clients—poor soul.

What is the answer to this problem of the relationship of the architect to his client? It can't be solved by forms and standards and codes of ethics, because it is basically a matter of personal relationship, mutual trust and respect, and very patient, elementary education of an inexperienced customer by his professional adviser. Neither the education nor the confidence can be established if the professional is cynical or abstruse. It seems to be a professional responsibility to keep in mind more often than usually is done the confusion that must plague many good clients, and to do one's best (while at the same time protecting professional standards and ethics and income) to clarify and simplify and explain step by step the difficult and unexpected problems that are going to arise.

Perhaps it is a feeble conclusion to this piece, but it seems to a number of observers today that the first improvement might be made in the verbal and graphic presentations that are given to the client. In other words, speak simply and draw clearly. The client isn't interested in spatial concepts and matters of design integration when he's worrying about room arrangements and budget matters. His æsthetic concern has little to do, in most cases, with the weighty matters of monumentality and style and regionalism and such—it can be translated quite simply into a desire to see a picture of what the building will look like. And to make that presentation drawing difficult to understand, or to make it look like something which will never exist in nature, is simply to add to his natural confusion.

If we were more willing to look at our professional activities from the client's point of view, our public relations might be easier to maintain and the continuing struggle to do better work might become less difficult and more pleasant.

Book Reviews

The Drawings of W. Curtis Green, R.A. 11 in. × 8½ in. viii + 96 pp. incl. pls. text illus. Batsford. 1949. £2 2*s*.

This is a refreshing book, which should be studied and enjoyed by every architect. Half a century ago Mr. Curtis Green made an outstanding name for himself as an architectural draughtsman, and the older amongst us will remember with what eagerness, as students, we looked to the weekly editions of THE BUILDER for the regular contributions that came from his skilful hand. In those days the art of pen-and-ink was more important than it is now, because photographic reproduction had not then reached its present efficiency. If ever there was a severe test of draughtsmanship, it was this medium, so seldom used today, and these earlier drawings form the background of the book, supplemented by later ones in pencil, wash, and water-colour.

In the training of the architect's mind, nothing can take the place of first hand study of actual buildings, observed with critical perception and delineated with careful accuracy. It is to be hoped that this delightful volume will cause teachers, students, and architects of all ages, to ponder on these things and to try and to emulate the industry and love of buildings in the round, that have impelled the author throughout his long working life. Here is a veritable encyclopædia of composition, of texture, of detail. By such tireless striving the architect acquires quality.

We all tend to develop a one-track and specialized mind in an age when we have too much to learn. This book is a salutary example of a catholicity of taste, a recording of far off days and unforgotten places, but a record of things that belong to all time.

One hundred and forty-eight drawings are admirably reproduced. Though his field covers Italy, France, Belgium and Spain, it is above all valuable as a study of things English and our English way of doing things. The Market House, Mildenhall, Northborough Manor House, Canons Ashby and Beaminster Church Tower are charming records of our own heritage. His sketches of the Palazzo Municipale, Piacenza, and the Tower of St. Martin, Ypres, now destroyed, are also notable.

In his introduction, Mr. Curtis Green declares his Gospel with simple directness and explains how different was the haphazard training of the young architect in those earlier days from the comprehensive, full-time courses of the schools. Like Professor Richardson, who contributes a characteristically vital foreword, the author is a Traditionalist, and points the moral of Tradition, the value of study, and the importance of travel.

In these days of overcrowded schools, where individual tuition is difficult to obtain, and mass production and uniformity of outlook are dangerous tendencies, it is salutary to be reminded that individual study of the real thing, the personal searching out of a good subject, and the mastering of its lessons, should never be dispensed with, however full the curriculum, however spoon-fed the scientific knowledge imparted by specialists. We tire of too much æsthetic theory. The true architect is an artist and the artist must express himself. He can only do this if he has a flexible and well-trained mind, if he has the vocation for a great craft.

HUBERT WORTHINGTON [*F*]

Mr. W. H. Ansell [*F*] (*Past President*) *has submitted an appreciation of 'The Drawings of W. Curtis Green' and a comparison with other architectural draughtsmen.*

Messrs. Batsford are justly renowned for the production of books which give pleasure to their fortunate possessors, particularly to those who, by previous experience, training or what you will, are already equipped for responsive enjoyment. The book of drawings by Curtis Green recently published enhances the Batsford reputation. Here is a delightful book of drawings by one of our most scholarly architects, a Gold Medallist and a Royal Academician; drawings which concern themselves with the pictorial delineation of fine architecture over a period of some fifty years, and awaken, in architects of the elder generation, memories not entirely untinged with regrets for the passing of an age and a way of life. The very index is the record of an odyssey, a truly adventurous journey, from Gloucester to Athens, from Amsterdam to Rome, from York to Ronda and Syracuse. The earlier drawings are for the most part pen drawings, rather 'tight' in some cases but even in the first examples showing a mastery of the technique of line drawing for reproduction. By the time Curtis Green was visiting Italy in the later nineties and the early years of this century his handling of line had become free and assured. In such drawings as the Great Porch at Bergamo and the lovely sensitive drawing of the Medea Colleoni Monument there is genuine artistry of a high order.

Pen drawing is a little out of fashion nowadays. The process block has largely superseded the line block but fifty years ago line drawing was very much alive. The work of the best known exponents of the art was eagerly looked for and the individual techniques recognized. The DAILY GRAPHIC was full of it and the DAILY CHRONICLE gave whole page space to Pennell drawings of great occasions. The ENGLISH ILLUSTRATED MAGAZINE had published Railton and Hugh Thompson's drawings of coaching days and coaching ways as early as 1888. Herbert Railton was a little frowned upon as being too prone to make picturesque whatever he drew and it must be admitted that he was over-interested in those little dexterous tricks of his facile pen. Yet there is in his work good sound architectural drawing and much knowledge which even the picturesqueness can not entirely disguise.

Inigo Thomas in 1892, for Blomfield's "Formal Garden in England," was making pen drawings of architecture of an indi-

vidual character made decorative by firm borders and lettered inscriptions. His drawings were masculine and at their best exceedingly good. His Brympton d'Evercy is beautifully drawn. In his introduction Mr. Curtis Green mentions E. H. New and F. L. Griggs. New's convention came as a welcome relief from the Railtonian technique, and in the great drawings of Oxford and Cambridge colleges, with heraldic surrounds making sumptuous patterns on the paper, he was at his best. Griggs, however, as an etcher of imaginative architecture and an illustrator of the buildings of English towns and villages, was a great artist of consummate skill. There is some evidence in Curtis Green's own technique of a Griggs influence than which there could be no better, and it is among such great names as these that Curtis Green must be placed.

Curtis Green appears to have had little difficulty in respect of what is, in fact, one of the most difficult problems in pen drawing, the getting of reflected light into his shadows, and the suggesting of much detail in quite deep shadow without either blurring in reproduction or coming forward out of its main tone. The frieze in drawing No. 42 is an example of this, as is also the freely drawn North Porch at Argentan (No. 64). Of the English churches the drawings of North Cadbury (No. 92) and Wymondham (No. 118) are particularly pleasing.

Many of the later drawings in the book are urbane watercolours of which that of the Acropolis is perhaps the most noteworthy, but I find myself harking back to some of the grittier pen drawings and the serene grace of the Colleoni monument for the true expression of the artist in his youth. This drawing is an example of a very successful co-operation which in no way lessens its beauty or its value.

However often one turns to look at a single drawing it is impossible to refrain from continuing through the whole series, which, it may be suggested, is a proof that the enjoyment felt by the artist in the making of the drawings is now transmitted to all who see them. W. H. ANSELL *[F]*

Basic Surveys for Planning, &c. Edited for the *Association for Planning and Regional Reconstruction* by *Jacqueline Tyrwhitt* and *W. L. Waide*. 8¾ in. 42 pp. + (3) folding maps. Architect and Building News. (Gilbert Wood.) 1949. 5*s*.

This small book is 'an attempt by specialists in conference with Kent County officers to outline a scheme for surveys satisfying the requirements of the 1947 Town Planning Act.' As such it is a useful supplement to the official circular No. 40 issued by the Ministry of Town and Country Planning on Survey for Development Plans. In the absence of a much needed detailed work it will probably serve as a temporary guide.

The book comprises three parts: (1) Basic surveys for a County Development Plan containing notes on 14 first priority and 7 second priority surveys; (2) Basic surveys for Development plans within the county covering 8 surveys; and (3) Examples of local surveys needed for certain detailed aspects of the plans—containing notes on 13 surveys.

The book dwells unequally on various aspects of land use, industry, agriculture, housing, transport and social services. It suffers from hasty compilation and occasional vague jargon—'land likely to be associated with factors of water supply' is an example. The illustrations are of little use and would have been better sacrificed for a cheaper booklet. Perhaps it should not be a point of criticism that the authors do not deal with methods of survey, standards of presentation, the cost of surveys, plans or their implementation, nor with the vital part that the public must play in the planning of the environment. The question of staffing the planning office has however been treated categorically.

The forty-two surveys are mostly to be undertaken by teams of geographers and economists. The architect apart from his interest in land use and housing has little to do and is chiefly required to survey country mansions, historic buildings and eyesores which can be undertaken by 'an antiquary, historian or other suitably qualified person.'

The authors in their introduction mention that 'the architect is to be almost entirely engaged upon the preparation of development plans and their implementation. This is not to suggest'—they continue —'that the economist and geographer would not also find themselves working upon the plans'—'plans' meaning as the authors go on to say—'the interpretation of the survey.'

Apart from a number of theoretical naivities perhaps unavoidable at a weekend conference, this book will be of value to those wishing to glean some of the ideas of well-known personalities in the planning world. But it is dangerous if regarded as an authentic supplement to Ministry Circulars. The urge to make a list has obscured the full picture of what had to be classified. But until a good book appears we must accept with gratitude the efforts of those who give up their week-ends to offer us the benefit of their deliberations.

MAX LOCK *[A]*

The Law of Housing, by *Sir W. Ivor Jennings*. 3rd ed. by *Harold Marnham*. With chapters . . . by *Frank E. Price*. 9½ in. lix + 847 *pp*. Chas. Knight. 1949. £3 3*s*.

This exhaustive publication has been recognized as a standard work since the first edition of 1935. Part I contains a survey of the Housing Acts, Part II deals with the Housing Act of 1936, Part III is concerned with other enactments relating to housing, while Part IV includes the Orders and Memoranda.

Geology and Scenery of the Countryside round Leeds and Bradford, by *H. C. Versey*. 8½ in. ix + 94 pp. text illus. Murby. 1948. 10*s*.

The author, an able geologist, has written a simple book for the general reader interested in the causes of scenic variety in the countryside. Not a text book.

Notes and Notices

NOTICES

R.I.B.A. Distinction in Town Planning

The R.I.B.A. Distinction in Town Planning is by conferment only, and is limited to Fellows, Associates and Licentiates of the R.I.B.A.

The Distinction is the highest award in Town and Country Planning that the R.I.B.A. can bestow. It is primarily for members of the R.I.B.A. who have made some contribution in the field of large-scale planning, especially in visual and three-dimensional planning which is so vital in the development schemes that will take place throughout the country.

Recommendations are submitted to the Council by a Standing Committee set up for the purpose.

Personal applications by candidates will not be entertained: the name of a candidate must be submitted by three sponsors, themselves members of the R.I.B.A., who will be required to submit the following particulars on behalf of the candidate:

(*a*) Details of professional qualifications and experience;

(*b*) Evidence of his work and achievements in the field of town and country planning, including three-dimensional planning; such evidence to consist of a list of the candidate's work, together with references to professional journals in which the works have been illustrated; and such other evidence as may assist the committee in making their recommendation to the Council.

Nominations should be made twice annually on 1 March and 1 November, and should be addressed to the Secretary, Royal Institute of British Architects, 66 Portland Place, London, W.1.

Members upon whom the Distinction has been conferred will be entitled to use the designation 'R.I.B.A. Distinction in Town Planning', and it is advised that this should be used in full, or the initials 'R.I.B.A. Dist. T.P.' after the initials F.R.I.B.A., A.R.I.B.A. or L.R.I.B.A., according to the class of membership to which they belong.

R.I.B.A. Diploma in Town Planning

Members are reminded that the Council of the Royal Institute have decided that the R.I.B.A. Diploma in Town Planning shall be discontinued.

The examination to be held in 1950-51, the closing date for applications for admission to which is 1 January 1950, will be the last examination qualifying for the R.I.B.A. Diploma in Town Planning, and will be based on a revised syllabus and time-table.

Any candidate who fails at that examination to satisfy the examiners will be unable subsequently to qualify for the R.I.B.A. Diploma.

A copy of the new syllabus may be obtained on application to the Secretary, R.I.B.A.

COMPETITIONS

Festival of Britain, 1951. Architectural Competitions

1. Vertical Feature, South Bank Exhibition

The Festival of Britain Office invite designers, architects, engineers and students in these professions, normally resident or practising in Great Britain, to submit designs in competition for the Vertical Feature proposed to be erected on the site in the South Bank Exhibition.

Assessors: The Presentation Panel of the Festival of Britain, viz.: Mr. Gerald Barry [*Hon A*], Mr. Cecil Cooke, F.R.S.A., F.I.A.M.A., Mr. Misha Black, O.B.E., F.S.I.A., Mr. Hugh Casson, M.A., M.S.I.A. [*F*], Mr. Ian Cox, M.A., Mr. Antony Hippisley Coxe, Mr. James Gardner, O.B.E., R.D.I., F.S.I.A., Mr. James Holland, F.S.I.A., Mr. Mark Hartland Thomas, M.A., M.S.I.A. [*F*], Mr. Ralph Tubbs [*A*].
Premiums: £300, £150, £100.
Last day for submitting designs: 14 November 1949.

2. Restaurant, South Bank Exhibition
The Festival of Britain Office invite architects and Students R.I.B.A., normally resident or practising in Great Britain, to submit designs in competition for the Restaurant proposed to be erected on the site in the South Bank Exhibition.
Assessors: Mr. Misha Black, O.B.E., F.S.I.A., Mr. Hugh Casson, M.A., M.S.I.A. [*F*], Mr. R. Furneaux Jordan [*F*], Mr. Mark Hartland Thomas, M.A., M.S.I.A. [*F*], Mr. Ralph Tubbs [*A*].
Premiums: £250, £200, £150.
Last day for submitting designs: 21 November 1949.
Conditions of both competitions may be obtained on application to the Secretary of the Presentation Panel, 'Festival of Britain, 1951', 2 Savoy Court, W.C.2, the envelope being marked 'Competition'.

University of Nottingham: Proposed Hall of Residence
The Council of the University of Nottingham invite architects to submit designs in competition for a Hall of Residence for Women Students on the Lenton Fields Estate, Beeston Lane, Nottingham.
Assessor: Sir Percy Thomas, O.B.E. [*F*].
Premiums: £1,000, £750, £500.
Last day for submitting designs: 11 March 1950.
Last day for questions: 1 November 1949.
Conditions may be obtained on application to The Registrar, The University, Nottingham. Deposit £2 2*s*.

Whitehaven: Arts Centre
The Whitehaven Corporation invite architects resident in this country to submit designs in competition for the Public Hall and Restaurant, which they propose to erect in Whitehaven.
Assessor: Mr. Harold A. Dod, M.A. [*F*].
Premiums: £300, £200, £175.
Last day for submitting designs: 15 March1950.
Last day for questions: 15 October 1949.
Conditions may be obtained on application to the Town Clerk, Town Hall, Whitehaven, Cumberland. Deposit £2.

Competition for the Interior Design of the Modern Public House
The Architectural Press, Ltd., invite architects and designers to submit designs in competition for four bars in contemporary public houses.
Assessors: Mr. Hugh Casson, M.A. [*F*], Mr. J. S. Eagles, M.B.E., B.A. (nominated by the Brewers Society), Mr. R. Furneaux Jordan [*F*], Mr. E. B. Musman, B.A. [*F*], Mr. J. M. Richards [*A*] (representing the Editors of THE ARCHITECTURAL REVIEW).
Premiums: £500, £250, £100.
Last day for submitting designs: 28 February 1950.
Last day for questions: 15 November 1949.
Conditions will be printed in the October number of THE ARCHITECTURAL REVIEW.

Civic Hall, Guildford
The Guildford Borough Council invite architects registered in the United Kingdom to submit designs in competition for the Civic Hall which they propose to erect in Guildford.
Assessor: Mr. G. A. Jellicoe [*F*].
Premiums: £1,000, £500, £250.
Last day for submitting designs: 30 April 1950.
Last day for questions: 15 Nov. 1949.
Conditions may be obtained on application to the Town Clerk, Municipal Offices, Guildford. Deposit £2 2*s*.

BOARD OF ARCHITECTURAL EDUCATION

R.I.B.A. Final Examination, July 1949
The Final Examination was held in London, Edinburgh, Manchester and Belfast from the 29 June to 9 July 1949.
Of the 306 candidates examined, 115 passed as follows:

Passed Whole Examination	50
Passed Whole Examination, subject to approval of Thesis	46
Passed Whole Examination, subject to approval of remaining Testimonies of Study and Thesis	1
Passed Part 1 only	18
	115

119 candidates were relegated.
The successful candidates are as follows:

Whole Examination

Abbott, L. A. (*Distinction in. Thesis*)
*Adkins, E. H. J.
*Ainsworth, E. N.
Aylwin, J. M.
Belcher, Daphne A. (Miss) (*Distinction in Thesis*)
Borthwick, P. L. B.
Bourne, K. C.
Bullock, W. G. S.
Carter, Gerard
Carter, G. B. (*Distinction in Thesis*)
Clark, Eric (*Distinction in Thesis*)
Clarke, W. A.
*Collins, S. F.
*Corby, E. R.
Cox, S. W. (*Distinction in Thesis*)
*Crook, N. C.
*Crosby, F. E.
De Souza, A. J.
*Dimond, J. F.
*Edwards, Ronald
*Elliott, P. A.
Evans, P. C.
*Finch, J. H.
*Firman, K. G.
Franklin, E. S.
*Gear, L. A.
Goff, J. F. (*Distinction in Thesis*)
Gorvin, J. W.
*Gowan, James
*Green, J. A. M.
*Hare, M. S.
Harrison, V. Rosemary (Miss)
*Hendry, L. A.
*Henman, G. S.
†Hitchon, Edward
*Hollow, J. A. R.
*Howes, G. P.
*Isherwood, E. G.
Jack, W. A. P.
*Jay, Raymond
*Jesseman, A. G.
Jobson, R. F.
Jones, Eric S.
Jones, Richard S.
Kelt, Andrew
*Kent, Oliver
Leadbeater, G. Mary (Miss) (*Distinction in Thesis*)
*Lewis, T. W. G.
Locke, Eirene S. (Mrs.)
Long, C. G.
Lovatt, Thomas
*Manwaring, R. E.
Masters, F. G.
*Milton, Ronald
Moxley, R. J.
Nixon, A. Vivienne (Miss)
Norrish, K. V.
Nunney, Joan C. (Miss)
*Nutter, F. G. F.
Oakley, D. F.
*Oxley, R. E.
*Pache, M. E.
*Pack, W. C.
Paine, C. N.
*Pooley, D. H.
Purkis, A. E.
*Radford, Robert
Radford, R. N. (*Distinction in Thesis*)
Rae, C. E.
Ralph, T. C.
Ross, C. L. M.
*Rowe, W. V.
Samuels, A. F.
*Shaw, P. A.
*Shaw, R. W.
Sherman, Madeline M. (Miss)
Simmons, G. I.
*Singleton, R. A.
*Smith, Eric H.
Smith, Keith P. (*Distinction in Thesis*)
Sutton, W. H. (*Distinction in Thesis*)
*Swain, A. H.
Taylor, Robert
Thomas, G. A.
Thompson, John
*Tiktin, Harold
Tindall, Kenneth (*Distinction in Thesis*)
*Towell, E. A.
*Turner, Frank
*Vickery, D. J.
*Ward, D. L.
Weeks, A. J.
Wells, G. B.
*West, J. C.
Wilson, C. H.
*Winter, Douglas
*Worby, L. P.

Part 1 only

Allan, Edith H. S. (Miss)
Borley, A. P. G.
Bucholc, Zdzislaw
English, Anthony
Francis, M. R.
Ham, A. J. L.
Jeffries, Reginald
Lambeth, D. F.
Leith, C. R.
Mason, R. J.
Nussbaum, Bruno
Podleski, Czeslaw
Scadding, E. F.
Smosna, S. B.
Stachiewicz, Meizcyslaw
Vick, F. N. H.
Wagner, A. A. W.
Williams, G. G.

*Subject to approval of Thesis.
†Subject to approval of Thesis and remaining Testimonies of Study.

The Special Final Examination, July 1949
The Special Final Examination was held in London Edinburgh, Manchester and Belfast from 29 June to 9 July 1949.
Of the 361 candidates examined, 71 (14 in Part I only) passed.
290 candidates were relegated.
The successful candidates are as follows :

Whole Examination

Assomatites, A. J.
Badnitz, L. S.
Bellamy, A. J. S.
Biggs, A. G.
Bird, A. C.
Boucher, E. J. T.
Broom, J. F.
Brown, James
Bryant, W. S.
Burn, F. A.
Cousens, E. N.
Crowe, Michael
Derham, R. D.
Durrant, R. A.
Eber, C. A.
Foyster, Harry
Halstead, L. J. P.
Hatherly, V. J. C.
Hewitt, S. N.
Hunt, Douglas
Johnstone, D. E.
Kemp, R. G.
Leifer, A. N.
Lister H. R.
Looker, C. G.
McArtney, J. W.
May, W. J.
Michell, H. N.
Milner, Alec
Mitchell, John
Moore, Alexander
Oldham, Harold
Packer, D. A.
Palmer, Norman
Rowe, P. V.
Rusha, C. H.
Simpson, M. J.
Skipper, E. J. G.
Slaney, O. E. F.
Smith, Frederick A.
Smith, John B.
Smith, Stanley H.
Stanwell, A. G.
Stapleton, J. A.
Stevens, E. J.
Stewart, J. A.
Tandy, C. R. V.
Townell, William
Trinder, V. W.
Tuckett, D. H.
Unger, Herbert
Urquhart, K. H.
Vanston, J. F.
Warner-Riley, W. S.
Westaway, R. J.
Whear, W. G.
Williams, F. C.

Part 1 only

Bass, E. V.
Farrow, G. H.
Green, A. R.
Horlock, L. E.
Kendrick, A. H.
Kent, S. G.
Lawton, T. W.
Longshaw, L. F.
Maggs, R. P.
Munday, C. J.
Pearce, D. W.
Thorne, H. L.
Turner, K. A.
Woolford, I. A. P.

The following candidates have also passed the Special Final Examination:

Halse, G. A.	Smith, H. Stanley
Lewis, T. W. J.	Smith, Warren K.
Montgomerie, H. G.	

The Examination in Professional Practice for Students of Schools of Architecture Recognized for Exemption from the R.I.B.A. Final Examination.
The Examination was held in Edinburgh on 5 and 7 July 1949. Of the 3 candidates examined 1 passed and 2 were relegated.

The successful candidate is as follows:
Williams, P. L. A.

R.I.B.A. Intermediate Examination, May 1949
The questions set at the Intermediate Examination held in May 1949 have been published, and are on sale at the Royal Institute, price 1/- (exclusive of postage).

R.I.B.A. Final and Special Final Examination, July 1949
The questions set at the Final and Special Final Examination held in July 1949 have been published and are on sale at the Royal Institute, price 1*s.* (exclusive of postage).

Building Surveying Examination
The Examination qualifying for candidature as Building Surveyor under Local Authorities will be held on 5, 6 and 7 October 1949, and not 4, 5 and 6 October as stated in the August issue of the JOURNAL.

ALLIED SOCIETIES

Changes in Officers and Addresses
Royal Australian Institute of Architects—Western Chapter. President, Mr. J. B. Fitzhardinge, 7th Floor, Gleddon Building, Hay Street, Perth, W. Australia.
The Nova Scotia Association of Architects. President, Mr. C. A. Fowler, M.R.A.I.C., Capitol Building, Halifax, Nova Scotia, Canada.
The Wessex Society of Architects. Address of Hon. Secretary, Mr. Kenneth Nealson [*A*] changed to 7 St. Stephen's Street, Bristol 1. (Bristol 20588.)

North Staffordshire Architectural Association
Following the death of Mr. Sidney R. Williams, who was Secretary of the Association, until further notice correspondence should be addressed to the President, Mr. Clifton Edwards [*F*], Stafford Chambers, 3 Brook Street, Stoke-on-Trent (Stoke-on-Trent 48567/8).

Norfolk and Norwich Association of Architects
The weather on Saturday, 9 July, contributed in marked degree to the success of the Annual Summer Outing to Ely. Some sixty members and friends, after lunching at The Lamb Hotel, visited the Cathedral under the guidance of the Dean, the Very Revd. L. E. Blackbourne, M.A., whose conversational manner of imparting information was greatly appreciated. The more agile of the visitors inspected the Octagon and were much impressed by its constructional form.

During luncheon the retiring President, Mr. A. G. Berry [*F*] introduced and invested the new President, Mr. Stanley J. Wearing, F.S.A. [*F*], who had previously held the office during the years 1928-29 and 1929-30.

After tea the new President made reference to the relinquishment by Mr. E. W. B. Scott [*F*] of the Hon. Secretaryship of the Association, and on behalf of the members presented to Mr. Scott as a small token of appreciation a framed water colour by J. Fletcher Watson [*A*], a member of the Association. Mr. Scott had held the office of the Hon. Secretary continuously since 1920 with the exception of four years in the 1930's when he was President and Past President. The party returned to Norwich in the evening after a most enjoyable Summer Outing.

Hampshire and Isle of Wight Architectural Association Prizegiving
At a council meeting of the Hampshire and Isle of Wight Architectural Association, at which the president (Mr. Ernest Bird [*F*]) presided, the Association's annual award of £40 was presented to Mr. R. M. Garrett, of Winchester. The award is made to the first year student of architecture within the Association's area who submits the best set of measured drawings and sketches. There was keen competition for the prize, and the work submitted was of a very high standard.

The annual summer outing of the association was to Longleat House, the home of the Marquis of Bath, and about 70 members and their ladies participated. Lunch were taken at Warminster, after which two hours were spent at Longleat. The party returned to Paulton's Hotel for dinner in the evening.

Royal Institute of the Architects of Ireland
The following are the results of the R.I.A.I. Final and Intermediate Examinations:
Final Examination. Pass: Messrs. W. J. Allen, J. J. Cantrell, H. P. Higginbotham, C. A. Manahan and T. F. Sheahan.
Intermediate Examination. Honours: Mr. G. Stanley. Pass: Messrs. H. F. Dagg, C. B. Dixon, F. McCarthy and C. M. Peelo.

GENERAL NOTES

The Salaried and Official Architects' Committee
Mr. C. H. Aslin [*F*] has resigned the chairmanship of the Salaried and Official Architects' Committee, owing to pressure of work, and Mr. Leonard C. Howitt [*F*], City Architect of Manchester, has succeeded him.

Acoustics of Auditoria
A course of lectures on Room Acoustics will be given in London this autumn by Professor R. H. Bolt, Director of the Acoustics Laboratory at the Massachusetts Institute of Technology. There will be six formal lectures at The Royal Institution, Albemarle Street, W.1, and in addition there will be three informal meetings for discussion, two of which will be for theoretical physics, and one for practical aspects of the design of concert halls, theatres, studios and other such auditoria. The arrangements have been made by the Acoustics Group of the Physical Society.

The lectures and colloquia are as follows:
29 September, 5 p.m., Standard Practice.
30 September, 5 p.m., Physical and Psychoacoustic basis.
3 October, 5 p.m., Standing Waves.
4 October, 10.30 a.m., Theoretical Colloquium.
5.30 p.m., Wave Statistics.
5 October, 10.30 a.m., Theoretical Colloquium.
5 p.m., Free Waves and pulse statistics.
6 October, 10.30 a.m., Architectural discussion.
7 October, 5 p.m., Future practice.

There is a registration fee of 10*s.* 6*d.* payable in advance for those who wish to attend any of the lectures, though this may be waived at the discretion of the Committee of the Group in the case of students.

All who wish to attend any of the lectures or the colloquia should inform the Joint Honorary Secretaries of the Group at 1 Lowther Gardens, Exhibition Road, London, S.W.7.

Franco-British Union of Architects Annual Meeting at Dijon
This year's Annual Meeting of the Franco-British Union of Architects was at Dijon, with a preliminary detour to Reims. British members who took part in the visit to the French section enjoyed an excursion they will certainly remember in the vine-covered slopes of the Côte d'Or.

The party left Victoria Station on 15 July, and included Professor Sir Patrick Abercrombie [*F*], Lt.-Col. Cart de Lafontaine [*F*] (Vice-President and Secretary-General), Mr. Arthur Davis, R.A. [*F*] (Past-President), Professor H. O. Corfiato [*F*] (Hon. Secretary British Section), Lt.-Col. O. Campbell-Jones [*F*], and Mr. A. V. Montagu [*F*] and Mrs. Montagu. Mr. R. E. Enthoven [*F*] and Mrs. Enthoven joined the party at Dijon. A visit to Reims Cathedral was made, under the personal guidance of the Archbishop and architect in charge, and was followed by a visit to the town before starting on a long motor coach journey to Dijon. A brief halt was made at Langres, a fascinating walled town on a hill, with a triple *enceinte* of the time of Vauban still nearly intact. Dijon was reached after nightfall.

The Annual General Meeting was held in the Town Hall of Dijon on Sunday 17 July. The minutes of the General Meeting held at the R.I.B.A. on 15 May 1948 were read and confirmed. The two Honorary Secretaries then reported on the past session for their respective countries, and both referred to the progress made in arranging exchange scholarships between the French Ecole des Beaux-Arts and the recognized British schools. Lt.-Col. Cart de Lafontaine then proposed M. Paul Tournon for election as President, and he was unanimously elected to preside over the Union for the ensuing session 1949-50. The meeting continued with M. Tournon in the chair, and proceeded to elect Professor Hector Corfiato and Mr. D. du R. Aberdeen [*F*] as Honorary Secretaries, British Section. Lt.-Col. Cart de Lafontaine and Mr. A. Schneider [*A*] were re-elected as Hon. Secretary-General and Hon. Secretary, French Section, respectively.

A discussion took place regarding the resumption of the joint competition which had previously taken place each year between students in the French and British Schools, and a mixed sub-committee was appointed to deal with this question and possible exchange of exhibitions of students' work. It was decided that the next Annual General Meeting should take place at Whitsuntide in 1950 with Cambridge as a centre.

The afternoon was spent at a champagne party given by the Préfet de la Côte d'Or at the Prefecture, an elegant building of the late 18th century, and later, the official banquet took place in the old kitchens of the Dukes of Burgundy, with the Mayor and Municipal Council of Dijon as hosts.

On Monday 18 July the first item of a full day's programme was a visit to the Château de Chambolle-Musigny, where guests were taken round the extensive cellars and sampled the famous vintage.

This was followed by a special lunch at the Château of Clos-Vougeot, which commenced with the ceremonial presentation of a whole sucking pig, decorated with jellies and parsley, which formed the first of the five courses of lunch, each accompanied by a special wine. After lunch a short motor run was made to Beaune, and the day ended with dinner by candlelight in an ancient tithe barn and return by motor-coach to Dijon.

On Tuesday 19 July an early start was made for Paris via Troyes, where the town and cathedral were visited. On Wednesday 20 July the party separated, some returning to London and some remaining in Paris for meetings of the newly-formed International Union of Architects.

Obituaries

William Alfred Pite [*Ret. F*] (Pugin Student 1883), who died at his Eastbourne home on 16 August, aged 89, was a member of a family distinguished in architecture.

During the first quarter of the century Mr. Pite was an active participator in the affairs of the R.I.B.A., being a member of the Council from 1906-09, a member of the Literature Standing Committee 1898-1906, the Science Standing Committee 1922-25, the Board of Examiners (Architecture) 1900-10, the Competitions Committee 1906-25, and of the R.I.B.A. Exhibition Joint Committee, 1922-25.

He was for several years a regular contributor to the professional press, being joint editor of the *Architectural Association Sketchbook*. He was an excellent draughtsman, and some of his sketches were published.

He married in 1891, and had two sons and two daughters. The second son was killed on active service in Palestine in 1918. His other son, Mr. Robert W. Pite [*F*], is a partner in the firm of Pite, Son and Fairweather.

Mr. Hubert M. Fairweather, C.B.E. [*F*], senior partner in the firm of Pite, Son and Fairweather [*FF*/*AA*], has sent the following appreciation:

'William Alfred Pite retired in 1937 from the firm he had founded immediately the 1914-18 War had ended and which followed his own practice commenced in 1884.

'Pite was the son of an architect, Alfred R. Pite, and elder brother of the late Arthur Beresford Pite, one time Professor of Architecture at the Royal College of Art. The two brothers were both brilliant and accomplished draughtsmen, and in 1883 William was awarded the much coveted R.I.B.A. Pugin Studentship, having won in 1882 the Travelling Studentship of the Architectural Association.

'William Pite built up a wide and varied practice in which his main interests were centred in ecclesiastical and hospital work, in which he excelled. He devoted a great deal of his time to the study of hospital planning, and these efforts were crowned by his success in 1906 in winning the competition for the New King's College Hospital at Denmark Hill. Building commenced in 1908 and continued until the greater part of the building planned for 600 beds had been completed.

'The New King's created great interest throughout the hospital world, and Pite gave the greater part of his professional life to the study of the many problems involved and the development of the detailed planning of the departments, most of which demanded specialized knowledge and investigation, over all of which he exercised the closest control and supervision.

'Throughout these years he was privileged to be associated with the Chairman of the Hospital, the first Lord Hambleden, who had presented the site. The two men paid frequent visits of detailed inspection together, and so formed a close friendship and regard for one another, which continued until the hospital was opened by King George V.

'The outstanding success at King's was followed by his winning the competition for the new Royal Infirmary at Bradford, but unfortunately this did not materialize. Later, the firm Pite, Son and Fairweather secured first place in the competition for the new Tuberculosis Hospital at Sully.

'I had the great privilege of knowing William Pite from my early days, so far back as 1896, when after office hours I joined the little band of enthusiasts then gathered round Pite at Upper Montague Street, where he then lived and had his practice. We all worked until the small hours on the most ambitious competitive schemes; I, as a junior member, being allowed to take part in some of the very minor duties.

'May I be allowed to pay my tribute to William Pite as a man; he was a great leader and Christian gentleman, upright and loved by all the members of his staff, many of whom have written mourning the loss of one we all regarded with the greatest affection and esteem. A memorial service was held in the Chapel at King's College Hospital on 29 August last, members of the family being present, together with many friends, old members of his staff and representatives of the hospital.'

Alfred Walter Saxon Snell [*F*]. Mr. Rees Phillips [*F*], senior partner in the firm of Saxon Snell and Phillips, of Bentinck St., London, W.1. has sent the following appreciation:

'Alfred Walter Saxon Snell, born in 1860, died on 8 June aged 89. Son of Henry Saxon Snell, he began to serve his articles with his father in 1877, was elected Associate R.I.B.A. in 1882, and Fellow R.I.B.A. in 1891. He was in practice at first with his father, and later on his own account, until, in 1921, he entered into partnership with Rees Phillips [*F*], and he continued to take an interested part in the work of the firm until shortly before the last war.

'During his long and active life, Saxon Snell's work was mainly connected with public baths, Poor Law infirmaries and kindred buildings, and hospitals; and in any survey of the planning and development of the Poor Law infirmary the name of Saxon Snell would be prominent, as being instrumental in promoting a better standard of accommodation in buildings designed for the use of the sick and aged poor. The gradual evolution of the infirmary is well illustrated by the work carried out during sixty years of practice, for Boards of Guardians and later for County Councils, resulting in the modern municipal hospital as exemplified by the St. Helier Hospital, Surrey, which was designed immediately prior to his retirement.

'In addition to the rebuilding of the major part of Charing Cross Hospital, the erection of Willesden Infirmary (later the Central Middlesex County Hospital), the London Lock Hospital, and St. Mary's Hospital for Women and Children, Plaistow, and of swimming baths for St. Marylebone, Cheltenham Ladies' College and St. Paul's Girls' School, Saxon Snell was much engaged in the modernization of existing institutions. He carried out a volume of work in alterations and additions for Boards of Guardians, in particular those of Barnet, Fulham, Holborn, St. Marylebone, Southwark, Uxbridge, Watford and Willesden; and, during the last few years of his partnership (after the transfer of ownership which took place following the Local Government Act 1929) for the Hertfordshire, Middlesex and Surrey County Councils. He was connected for a great many years with Brompton Hospital for Consumption, and was responsible for extensive alterations and additions, both at the Hospital itself, and at Frimley Sanatorium.

'In support of the activities of the R.I.B.A. he served on the Science Standing Committee or the Practice Standing Committee almost continuously from 1898 to 1919; and on the Competitions Committee, and also as an Honorary Examiner in 1910. He acted as Chairman of the Berkshire Society of Architects in 1931 and in 1935, as President of the Berks, Bucks and Oxon Architectural Association, and in that capacity served on the Council of the Institute from 1935-37. His papers on "The R.I.B.A. Conditions of Contract: some points for revision" and "Modern Hospitals" were read before the Institute, and on "Military Emergency Hospital Construction" at a Chadwick Public Lecture at the Royal Society of Medicine, all three papers being subsequently published in the R.I.B.A. JOURNAL.

'Saxon Snell was keenly interested in the work of the Architects' Benevolent Society, of which he was always a generous supporter, and he served on its Council for a number of years.

'A man of high principles and of religious convictions, he had a quick appreciation of essentials, and would bring sound judgment and good sense to bear upon any situation, so that his opinion was sought and valued. There was a quality of kindness and forbearance in his personal relations which will long be remembered by those who lived or worked with him. He was exceedingly generous, and, taking quite literally the biblical injunction, he set aside one tenth of his income for charity, and could always be relied upon to offer immediate help in any case of need or hardship that was brought to his notice.

'He was married in 1884, and his wife died in 1947, three years after they had celebrated their diamond wedding. His only son was killed in the 1914-18 war, and he leaves two daughters.'

Walter G. Moffat [*F*], late senior partner in the firm of Moffat and Simpson, practising in Durban, Natal, was born in 1880 and died on 16 March 1949. He was articled early in this century to his brother, Mr. J. A. Moffat and Partners in Johannesburg. Thereafter he went to London and then to Alexandria in Egypt, where he practised on his own for a number of years. About 1910 he opened an office in Salisbury, Southern Rhodesia, and went to Durban about 1918.

Mr. Moffat was a member of the Institute of South African Quantity Surveyors, a Member of the Association of Transvaal Architects.

He did a lot of work in Natal of a domestic and commercial nature, his principal buildings being the Pietermaritzburg Law Courts, South African Reserve Bank of that city, and the South African Reserve Bank in Durban and the National Mutual Life Association of Australasia in Durban.

Howard George Ingall [*A*], aged 24, wrote the thesis for his recent qualification as an Associate while in bed at home, an invalid. He died on 13 July. About four years ago he was invalided out of the Royal Marines with spinal trouble.

Born at Coalville, Leicestershire, Mr. Ingall spent most of his life in Leicester, and was educated at Leicester City Boys' School and the School of Architecture. After coming out of the Forces he returned to the Leicester School of Architecture and completed his training. For some time he had been unable to get about and was confined to bed.

Edwin Francis Reynolds [*F*], a partner in the firm of Wood and Kendrick and Edwin F. Reynolds, of Birmingham, Soane Medallist (1903), born in 1875, died in January of this year.

After studying in Italy, Egypt, Greece and Turkey he commenced practice in Birmingham in 1905; he was for some time a lecturer, and later became Deputy Director, at the Birmingham School of Architecture.

Mr. Reynolds designed many factories, canteens, offices, shops and licensed premises in Birmingham and the Midlands, and in his earlier career large houses at Lapworth, Widney Manor, Four Oaks, Shirley, Berkswell, Leamington Spa, Knowle and Warwick; he remodelled and restored Packwood House, Warwickshire, just prior to its presentation by the owner to the National Trust. He was a supervisor of the Birmingham City Council for Aston Hall and Blakesley Hall, and architect to the

Trustees and Guardians of the Shakespeare Trust. In the early part of the century Mr. Reynolds wrote articles in the ARCHITECTURAL REVIEW on Turkish Imperial mosques.

Mr. T. Spencer Wood [*F*] carries on the practice of Wood and Kendrick and Edwin F. Reynolds at 57 Colmore Row, Birmingham.

Thomas J. Fox [*L*], who died on 25 August, aged 78, practised from 1901 in London. He was articled to the late F. Boreham [*A*] and studied at the City of London College and the A.A. After training, he became Mr. Boreham's assistant till his death in 1901, when Mr. Fox commenced personal practice. His work was mainly commercial. He extended the reinforced concrete premises of the Cornwall Press in Stamford Street, and the London factory of Johnson and Phillips, Ltd., and built many office and business premises in South and South-East London.

Since being bombed out of his Bloomsbury office, Mr. Fox had practised from his home in Stroud Green, and was in active practice up to a few weeks before his death. He was elected Licentiate R.I.B.A. in 1911.

Cecil Barber [*A*], of Baildon, near Shipley, Yorkshire, designed Baildon Town Hall and reconstructed the Church of England Schools there. He was chief assistant to William Illingworth and Son [*F*/*L*], and in that capacity was responsible for many commercial and domestic architectural works in the locality of Leeds, Harrogate and Bradford. He served in the First World War, and in the last was a Platoon Commander in the Home Guard.

He was elected Associate R.I.B.A. in 1921.

Mr. Barber died on 31 July last, aged 62.

Members' Column

This column is reserved for notices of changes of address, partnership and partnerships vacant, or wanted, practices for sale or wanted, office accommodation, and personal notices other than of posts wanted as salaried assistants for which the Institute's Employment Register is maintained.

APPOINTMENTS

Mr. R. H. Browning [*A*] has resigned from the Department of Works and Housing, South Australia, and taken up the appointment of Assistant Architect, Public Works Department, Colombo, Ceylon, and would be pleased to receive trade catalogues etc. at that address.

Aycliffe Development Corporation, Simpasture, Newton Aycliffe, near Darlington, Co. Durham. **Mr. G. A. Goldstraw** [*A*], Chief Architect, **Mr. P. A. Cranswick** [*A*], **Mr. Granville Pyne** [*A*] and **Miss Jean M. Griffiths** [*A*], Assistant Architects, have taken up such respective appointments with the Aycliffe Development Corporation and will be pleased to receive trade catalogues etc.

Mr. L. Howarth [*A*] has been appointed Assistant Chief Architect (Housing) to the Glenrothes Development Corporation by Auchmuty House, by Markinch, Fife. Private address 'Glenugie', Innerleven, Methil, Fife, Scotland.

Mr. T. J. Manickam [*A*], who has been appointed Senior Architect, Central Public Works Department, Government of India, will be pleased to receive trade catalogues etc. at Central Public Works Department, L Block, New Delhi, India.

Mr. Frederick Napp, A.M.T.P.I. [*A*], has been appointed Deputy City Architect of Plymouth. He will take up his new appointment in October, when his official address will be Weston Lodge, Seymour Road, Plymouth.

Mr. John Williams [*A*] has resigned his appointment as Senior Assistant Architect to the Cheshire County Council, and has been appointed Chief Assistant Architect to the Middlesbrough Education Department. All future correspondence should be addressed to him at 70 Cumberland Road, Middlesbrough, Yorkshire.

Mr. E. F. Wilson [*A*] has been appointed Architect to the Sheffield Regional Hospital Board. From 26 September 1949 his office will be Fulwood House, Old Fulwood Road, Sheffield 10, to which future communications should be sent.

PRACTICES AND PARTNERSHIPS

Arising out of the death of **Mr. Peter G. J. Carter** [*F*] on 15 August, the practice of **Dawe and Carter,** 83 High Street, Watford, will be continued by his partners, **Mr. J. L. Caldwell** [*A*] and **Mr. Robert Neil** [*A*].

Mr. H. Anthony Clark [*F*] has entered into private practice with **Mr. F. C. Roberts** [*A*]. They will practise as **H. Anthony Clark, F. C. Roberts and Partners,** 41 Regent Street, Wrexham (Wrexham 3339). Mr. Anthony Clark has relinquished his appointment as Architect to the Wrexham Borough Council.

Mr. Charles Errington [*L*], previously practising in partnership with **Mr. H. A. Wilson** [*A*], has taken into partnership **Mr. Oswald Gill, B.A.** [*A*] on the retirement from active partnership of Mr. H. A. Wilson. They will continue to practise under the name of **Charles S. Errington** at 46 Grainger Street, Newcastle-upon-Tyne 1 (Newcastle 20208), and Mr. Wilson will still continue to be associated with the practice.

Mr. C. J. Greening, A.M.T.P.I. [*A*] is now practising on his own account, and pending permanent office accommodation he is working from 'Shirley', Felbridge, East Grinstead, Sussex (East Grinstead 279), where he will be pleased to receive trade catalogues etc.

Mr. J. E. Hellawell [*L*] has commenced practice at 1 Eldon Square, Newcastle-upon-Tyne 1 (Newcastle-upon-Tyne 25885), and will be pleased to receive trade catalogues etc.

Mr. G. F. Nicolls [*A*] has opened an office at 7 Mount Ephraim Road, Tunbridge Wells (Tunbridge Wells 948), where he will be pleased to receive trade catalogues etc.

Mr. R. Brian Martin [*A*] has commenced practice at 183 West Heath Road, Northfield, Birmingham, and will be pleased to receive trade catalogues etc.

Mr. Kenneth G. Miller [*A*] has opened an office at 7 Mount Ephraim Road, Tunbridge Wells, Kent, and will be pleased to receive trade catalogues etc.

Sir Giles Gilbert Scott, O.M., R.A. [*F*], has taken into partnership his son, **Mr. Richard Gilbert Scott** [*A*]. The firm will in future be known as **Sir Giles Gilbert Scott and Son**, 3 Field Court, Gray's Inn, London, W.C.1.

Mr. Rupert Lyell Thorpe, A.N.Z.I.A., A.M.T.P.I. [*A*], has commenced practice at 29 Nassau Road, Barnes, London, S.W.13 (RIVerside 4330), where he will be pleased to receive trade catalogues etc.

Mr. Ivor Warner [*A*] has commenced practice at 28 Selig Gardens, Newbury Park, Ilford, Essex (Seven Kings 8246), and will be pleased to receive trade catalogues etc.

CHANGES OF ADDRESS

The new office address of **Mr. Percy Bartlett** [*F*] is Castle Gate Chambers, Castle Gate, Nottingham (Nottingham 43924). (The former address was 19 Herbert Road, Sherwood Rise, Nottingham.)

Messrs. Grace and Farmer [*F*] have transferred their offices from 3-4 Wardrobe Place, London, E.C.4, to 1 Chichester Court, 5 Crawford Street, London, W.1 (WELbeck 2168).

Mr. James C. Kennedy [*A*] has changed his address to 64 Talbot Road, Highgate, London, N.6 (MOUntview 2753), to which all future private and professional correspondence should be addressed.

Mr. A. L. Parsons [*A*] has removed from 91 Heavitree Road, Exeter, to 34 Ash Grove, Maidstone, Kent.

The Portsmouth District Survey and Plan (Max Lock Planning Group) work having now been completed, the office at 20 High Street, Fareham, Hants, has been closed. All communications to **Mr. Max Lock** [*A*] should now be addressed to Alverbank, Stanley Park, Alverstoke, Hants.

Mr. M. S. Rivett [*L*], formerly of 78a Christchurch Street, Ipswich, Suffolk, and Thorpe Bay, Essex, has removed to Eagle Lodge, Mylands, Mile End, Colchester, Essex (Colchester 4711).

PRACTICES AND PARTNERSHIPS WANTED AND AVAILABLE

Associate (39), with wide experience in Government and private practice at home and abroad, including housing, flats, agricultural and public building work, seeks partnership or responsible and administrative post leading thereto, preferably in Sussex or South Coast town. Car owner. Box 70, c/o Secretary, R.I.B.A.

Member (42) at present practising in London, seeks partnership in active practice in S.W. England or West Midlands. Experienced (including factories, domestic and Gothic work). Keen. Capital available. Box 72, c/o Secretary, R.I.B.A.

Partnership for sale in young but progressive architect's practice in Eastern Counties. Box 71, c/o Secretary, R.I.B.A.

WANTED

Wanted. ARCHITECTURAL REVIEW for 1941-42, or numbers for November 1942, or May 1941. A. Neville Holt [*F*], 20 Exchange Street, East Liverpool 2.

ACCOMMODATION

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